DECISION SUPPORT SYSTEM FOR DEFENCE PROCUREMENTS

A Thesis Submitted
In Partial Fulfilment of the Requirements
for the Degree of
MASTER OF TECHNOLOGY

By

MAJOR S. S. AHLUWALIA

to the
DEPARTMENT OF ELECTRICAL ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY, KANPUR
AUGUST, 1983

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CERTIFICATE

Certified that the work on 'Decision Support System for Defence Procurements' by Major S.S. Ahluwalia has been carried out under our supervision and has not been submitted elsewhere for a degree.

(V.M. Malhotra)
Lecturer
Computer Science Programme
I.I.T. Kanpur 208016, India.

(R. Raghuram)
Assistant Professor
Department of Electrical Engg.
I.I.T. Kanpur 208016, India.

ACKNOWLEDGEMENTS

I wish to put on record my deep sense of gratitude and sincere thanks to Dr. R. Raghuram and Dr. V.M. Malhotra for their invaluable guidance throughout the preparation of the thesis. Thanks are also due to Dr. B. Srinivasan for his guidance and interest shown in selecting the topic.

I shall be ever grateful to my Director Brig. N. Dayal,AVSM for sponsoring me to the M.Tech. programme.

Words fail to express my gratitude to my friends for the amusing company they gave and made my stay at IIT Kanpur a pleasant and memorable one.

Maj. S.S. Ahluwalia

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ABSTRACT

This thesis describes the design and implementation of a computer based decision support system for parameter evaluation of Defence Procurement. The major components of information are identified and a systematic way of data structure validation and report generation is achieved.

The decision process is automated by integrating and storing data in a data base. DBMS-10 package available on DEC-1090 System at IIT Kanpur is used for creation of data-base.

The development and implementation of a Decision support system is discussed in detail. Various types of programs for load, update and Retrieval of data are developed. Necessary reports are generated to meet the users requirements. The decision support system is modular in design and implementation, offering the user a spectrum of specific capabilities. The user can use a specific modules without incurring the overhead of the other modules.

CHAPTER 1

INTRODUCTION

1.1 DECISION SUPPORT SYSTEM

The aim of decision support systems is to improve effectiveness of decision making by computer aids to the decision maker. A decision support system is a computer based system that is used on an ongoing basis by managers themselves, or their immediate staff, in direct support of managerial decision-making [1]. What has actually made decision support systems feasible and wide spread is the availability of software packages on computers that facilitate development of specifies user-defined DSS. A DSS is a vehicle to help managers to make more informed (and hopefully better) decisions [2].

The information produced by a DSS consists mainly of interactive-iterative reports and unstructured reports. In the search for supporting information in a specific decision situation, the user may be required to iterate particular reports. And adding and deleting selected variable deemed to be important components of the individual decision making procedure. Reports involving complex relationships such as portfolio management, budget analysis selection of competent vendor, analysis of typical items

(products) are some of the products of a DSS. However, these reports only represent a fraction of the potential output from a DSS.

Decision support systems have been developed as a result of managers trying to cope with decisions that include complex variable interactions. The ultimate object of a DSS is to help support a manager in making a decision.

An important characteristic shared by all computer-based information systems is the need for periodic re-structuring, updating and expansion unrelated to simple maintenance and error elimination.

The three important agents as integral to the development of a DSS are :

i) The client, who initially solicits the development of a system, specifies all performance criteria and often pays for the system.

ii) The decision maker or user who actually interacts with DSS and to whom the support aspects are tailored.

iii) The designer who specifies the details structure and capabilities of the system and is responsible for its implementation.

In some cases, the client and the user are the same individual, while at other times one person plays the three roles [2].

1.2 SCOPE OF THE THESIS

This thesis describes the design and implementation of a computer based decision support system for a defence organisation which is responsible for production and procurement of Electronic and Electrical items/equipments for Army and Navy.

A modular Data-base is designed and developed integrating and storing relevant information. Application Programs are developed and various reports are generated to meet the users' requirements.

The existing system maintains various records/file about Firms (suppliers) registered with defence, item/equipments projected for procurement, Projects earmarked for critical items/equipments, order placed for procurements, and inspection record of store inspected and released. The Firm record includes the list of products manufactured by the suppliers, the specification to which items/equipments are produced, financial position of firm and other details about firm, these are discussed in detail in Chapter 2. The other records contains information regarding projection and procurement of items/equipments and monitoring of critical items. Presently, these information are maintained on cards/files. The updating and retrieval of information to aid decision making is tedious and time consuming. There is,

therefore, a need for computerised data base to generate accurate and timely reports for making judicious decision in placing orders with competent firms so that defence store of the right quality materialise, as per laid down schedule at optimum price.

1.3 PLAN LAYOUT OF CHAPTERS

Chapter 2 describes the existing system and associated problems in maintaining and updating information.

Chapter 3 highlights the need for a data base, choice of programming feature. It also deals with the design methodology of a data base.

Chapter 4 gives in detail, the process of implementation of a data base using the DBMS-10 package available on DEC-1090 system at IIT Kanpur. This package is based on CODASYL 1971 Data Base Task Group (DBTG) proposals. Other features of the system like utility programs and back up strategies are also discussed.

Chapter 5 gives conclusion and recommendations for further expansion of the system.

CHAPTER 2

LITERATURE SURVEY OF EXISTING SYSTEM

The control flow chart of the existing system for demand and procurement of Electronic and Electrical equipments/items is given in Appendix A. Controllerate of Insp.Electr. (CIL) maintains a directory of competent suppliers (FIRMS). The capacity assessment of FIRMS is carried out by market survey teams and reports of their suitability for defence supplies or otherwise are forwarded to CIL through Regional Inspectorates. The control flow chart for capacity assessment is given in Appendix B.

Various records are maintained at CIL for suppliers to assess the potential of the FIRM for executing Defence Order. Selection of competent firms for floating tender enquires is a vital link in the chain of supply of defence stores. Following information about FIRMS registered with CIL for defence supplies is always available :

i) Capacity Report

ii) R and D facilities available with FIRM

iii) Quality Control Method Adopted

iv) Test Certificates/Qualification approval certificates, Limited Test Certificates/Limited Qualification Approval certificates issued to the FIRM.

v) Prototypes successfully designed and developed by the firm

vi) Financial position

vii) Performance before and after placement of order

viii) Range of products manufactured.

ix) Misc. details like collaboration if any, Registration with DGS and D or Director of Industries etc.

Based on the above information each firm is given a separate notation and designation which summarises information on the firm.

An example of notation designation is

$- LA_1-I_1R_1Q_1O_3F_1/N_6M_2/S_1U_1O_1P_O$

This indicates that the FIRM is an Electronic equipment manufacturer ('L' is for Electronics), that it is recommended for placement of large orders (A_1), and that it is a large scale industry (I_1) with good R and D and Quality control facilities. So far it has not developed any prototype. It is financially sound. It has responded to tender enquires six times and the quotation of the firm was rejected twice. It has executed one supply order without delay and one with delay. There is one current supply order which is being executed. No supply order has been cancelled due to unsatisfactory performance.

A very careful assessment of the competence of firms to produce electronic goods to the desired defence specification is necessary. The main problem of the existing system lies in keeping track of items and equipment projected for procurement and monitoring of critical defence equipment (Projects).

In the present system, which is manual updating of information and report generation to aid decision making is time consuming and prone to human error. An inaccurate report may lead to wrong decision in selecting competent firm for materialisation of critical defence project. There is, therefore, a need for computerized information system to provide on line facilities to retrieve and update the data and generate accurate and timely reports for aiding decision making.

CHAPTER 3

ENVIRONMENT FOR THE PROPOSED DSS

3.1 NEED FOR DATA BASE

As explained earlier, it is essential to have a computerized information system for the organisation. There are two options available for the development of computerized information system.

1) To use conventional File Organisation Method :

In these methods the operational data may be kept in index, sequential or direct files. This method has two advantages.

a) Implementation is easy, and

b) Storage organization can be changed easily.

However, the retrieval of operational data, based on a multitude of purposes becomes really difficult and requires too many files to be maintained. This may lead to inconsistency of data. Also integration of the system with other information systems becomes a difficult problem.

2) To use DBMS :

A data base management system is a collection of stored data used by the application systems of an enterprise. It

provides centralized control of its operational data which is most valuable asset. Beside these, the data base management system provides the following advantages :

a) Ease in system design and programming

b) Independence of data and programs

c) Concurrent usage

d) Consistent and upto data data

e) Protection and security of data

f) Multiple host languages

g) Data integrity can be maintained.

3.2 CHOICE OF PROGRAMMING LANGUAGES

The data base management system available on the DEC-1090 system can be used with FORTRAN, and COBOL. In this thesis COBOL has been used because it is best suited for record handling widely used for info. proc. application. It can be easily understood by any user who wishes to modifies certain application programs. The complexity of COBOL programming can be effectively controlled by employing structure of a programming concepts. We have decided to use COBOL with DBMS, so that the package can be easily implemented on any computer made available to the defence organisation in future.

3.3 DBMS-10 FEATURES

The DBMS package available on DEC System 1090 is a group of programs that enable an installation to create, access and maintain one or more data bases. It is based on 1971 CODASYL data Base Task Group proposals.

A data base is a collection of interrelated data records structured and linked so that run-units can access them without regard to the physical storage medium. DBMS has two inherent advantages :

1) Removal of data description from the application programs.
2) Centralization of data management.

A CODASYL DBMS data base has the following additional advantages :

1) It allows to structure the data in a manner most suitable to each application program although that data may be used by many programs.
2) It allows more than one run-unit to concurrently retrieve the data in the data base even while a run-unit is updating it.
3) It provides a variety of search strategies that can be used on an entire data base or portions of it.

4) It provides protection of the data base from unauthorized access as well as from destructive interaction by run units.

5) It provides a number of ways in which one can relate the data records to each other.

3.4 COMPONENTS OF DBMS-10

DBMS-10 consists of the following components :

SCHEMA : The translator that processes the language used to describe the data bases. It also allocates and initializes the storage space for the data base.

DBMENO : A utility program for back-up and recovery of portion of the data base.

DB Info : A utility program that produces several reports such as cross reference listing and dumps of data base.

COBOL DBMS Module : The module of the Cobol compiler that processes data base accessing statements.

DBCS : The object-time module of DBMS used with FORTRAN and COBOL object time systems to access the data base.

For further details see [3].

CHAPTER 4

DEVELOPMENT AND IMPLEMENTATION

4.1 DATA STRUCTURE

An outline architecture for a data base system is shown in Fig. 1 [2]. The architecture is divided into three general levels: internal, conceptual and external. The internal is the one closest to physical storage, that is the one concerned with the way in which the data is actually stored; the external level is the one closest to the user that is, the one concerned with the way in which data is viewed by an individual user; and conceptual level is a 'level of in-direction' between the other two.

Fig. 2 shows the decision support system data base using data structure diagram notations. Data structure diagram is a graphic notation which uses two fundamental components - a rectangle and an arrow. A rectangle enclosing a name denotes an entity or record type. The second component is a directed arrow connecting two record types. The record type located at the tail of the arrow is called the owner record type and the record located at the head is called the member record type. This arrow directed from owner to member is called a set type and it is named.

The Data base structure shown at Fig. 2 shows a number of set types where the owner is the system. These sets are called singular set. Based on the types and frequency of retrieval and updating of various data, these singular sets are provided with sequential access of various record types for efficient processing.

4.2 SCHEMA

The Schema SSABAS.DDL for the decision support system is given in Appendix C. It defines the entire data base that is stored and available to all users. But an application program may need to view only some parts of the data base, and make some simple changes.

The statement 'Schema Name is SSABAS' names the schema. Statement following this statement are the area entries. All areas are named and privacy lock for exclusive update and retrieval for the opening of these areas may be specified. The schema defined will not allow simultaneous update although it is possible in DBMS-10 [2]. Simultaneous updates are costlier and are present when the data is accessed by multiple users simultaneously.

The decision support system data base is divided into six areas which are :

1) Inspection-Detail-Area

2) Item-Detail-Area

3) Project-Detail-Area

4) Projection-Area

5) Firm-info-Area

6) Man-Pro-Area (Manufacture product area)

There are a number of record types described in the data base. Item description for various data-items in each Record type is self-explanatory. One Record field for FIRM-Record is described in detail.

4.3 FIRM RECORD

Location Mode clause specifies the way in which record occurrences should be placed and retrieved. For this record type CALC is specified. CALC refers to key-to-address transformations technique (hashing). This clause specifies that FIRM-RECORD is placed according to the value of FIRM Name. The duplicate clause specifies that if any attempt is made to store a new but duplicate occurrence of FIRM-Record record, the system should reject the request and notify the application program of the rejection. By this clause storing of duplicate records is eliminated.

4.4 RELATION

The relationships between various record types, are described by means of the sets. Each set description names the set type, specifies the owner-record type and member-record type and gives detailed information on how occurrences of the set are to be ordered andselected. The singular sets are those in which the owner is the system and since the system is the unique owner, there can exist only one occurrence of such a set type. There are six singular sets in the DSS data-base. One set ALL-FIRM is selected for description.

4.5 ALL-FIRM-SET

After name of the set, the mode of set is defined as CHAIN. This indicates the mechanism for the manipulation of record occurrences within the set. It indicates the way member-record occurrences in the set are linked together and with the owner. The duplicate clause indicates whether duplicate records are permitted for the defined keys, and if they are, how they should be handled. In this particular set duplicates are not allowed. Next part of the declaration viz. OWNER clause specifies the name of owner record type and the declaration of system as owner denotes singular set.

The member sub-entry names the member-record type. MEMBER is clause names the member of the set. This is followed by a clause specifying permitted methods for a member record occurred from its membership to a set occurrence.

MANDATORY specification indicates that once an occurrence of FIRM-Record is placed in the ALL-FIRM set it may not be removed from the set occurrence without actually deleting the record occurrence. Automatic specification specifies that each time a new occurrence of firm-Record is stored in the data base it is automatically inserted into the ALL-FIRM set.

A complete description of the database scheme used in the propose DSS describes various set types, their corresponding owner and member record types and options used can be found in the schema listing given in Appendix C.

4.6 APPLICATION PROGRAMS

Various programs are written to aid loading, updating and retrieval of data. The programs are written only for the portion shown in dotted lines, the portion excluded contains information which is confidential in nature and also requires considerable amount of input data. However, since the schema converts the entire data structural diagram the load, update and retrieval could be expanded easily to cover the other Record types.

4.7 SYSTEM FLOW CHART

System flow charts are schematic representations of data flow in the system Fig. 4.1(a) through 4.1(c) show in detail the flow of operational data and also how the data is retrieved and updated in the data base.

Various flow paths are discussed in brief. The application programs which carry out the different data base operations are given.

i) Loading Path

Fig. 4.1(a) shows the flow of master data into the data base. The input data files are created on desk (EDITIN.DAT) which are edited by corresponding programs (EDIT.CBL) for validating. Two files are created by EDIT.CBL, ERROR.LST and INPUT.DAT. If data is found to be valid INPUT.DAT file is created and ERROR.LSI file remains empty. But if data is erroneous then ERROR.LST file contains list of errors detected and INPUT.DAT is empty. The procedure for preparation and editing of data is describe in subpara 4.8.

ii) Update path

Fig. 4.1(b) shows the information flow paths for operational data during various updates operations. The bulk of data will be loaded into data base with the help of LOAD programs but user may require programs to update the data loaded by adding new information or deleting absolute

information loaded initially in the data base by load programs.

The update programs provides the users on line facility to update data base as and when required. The UPDAT programs are interactive and access is provided for modifying any data indata base. The update programs are discussed in sub-para 4.10.

iii) Retrieval path

Fig. 4.1(c) shows the flow path during the retrieval of information by the user. The user may like to generate various reports to aid decision making, this facility is provided with the help of on line interactive Retrieval programs. Various types of reports are generated by Retrieval program about items supplied by manufacturers, list of firms who are capable of producing desired items, the vandor rating of firm and details about firms in coded form. The retrieval procedure is explained in detail in para 4.11.

4.8 DATA PREPARATION AND EDITING

Information on various data elements should be entered in the corresponding files. Once the data file is created, the Edit program should be run to check the validity of the data. If any data is found to be invalid or erroneous, the corresponding error message are given in the corresponding

error list for further correction. If the data file is found valid, then the corresponding input data file will be created by the edit program, which will be used by the corresponding load program to store data in the data base. Only one Edit Program is written to check the validity of Item-Record in detail. This program can be expanded when actual data is used.

4.9 LOAD PROGRAMS

Load Programs loads the various data items into data base. It sets various link required in storing of data which are used for retrieval of information and report generation. The design of data base is modular and relevant information can be loaded into data base by accessing only the specified record fields.

The modular design makes data base cheaper and efficient in loading and retrieval of information. It is therefore desirable to use number of load programs depending upon the requirements of the user. Three load programs LOAD1.CBL,LOAD2.CBL and LOAD3.CBL are written to load different record fields.

LOAD1.CBL loads information about Firms, Projects, items supplied and Range of products manufactured by the suppliers. The information about Firms includes past performance of firm, Quality control arrangements, R and D facilities, financial position, vandor rating of firm and firm code which gives

detail information about firm in coded form. The project information include quantity on order, value of order, date for submission of prototype and number of extention given for meeting delivery schedule. The information about item supplied in past with part-number of item, range of products manufactured by the supplier, with rate of production and specification is also loaded by this program.

4.10 UPDATE PROGRAMS

When only a few records are to be entered or deleted from data base on line programs are useful. The update programs provide on line facilities to update the information loaded in data base. The user can add new information or delete an absolute information from data base by running UPDAT program. The program is interactive and user can access any record for addition or deletion of information. Self explanatory questions are asked by the program and user is asked to provide the information about update of record fields. UPDAT program provide the facility to correct the data erroneously given by the user before updating. Once the data is validated the program stores the data and sets the appropriate links for records. The user is then informed about the successful loading or deletion of information. Wrong deletion of record may be fatal, program provides the facility of confirmation by user before deletion by printing the appropriate record. The record is deleted only when

confirmed by the user. The UPDAT program provides facility to add or delete Firm, Item, Project and manufactured products records. The program can be expanded to include more record depending upon the need of user. A typical run of up-date program is given at Appendix E.

4.11 RETRIEVAL PROGRAMS

INFO.CBL Program

Five types of quiries are available to retrieve data about firms, items supplied, projects in which the firm is involved, manufactured products. The following reports are generated when required by the user.

1) By giving the CAT-PAT-ON the user can get the names of firms who have supplied this item in the past, vendor rating of firms and important def items manufactured by these firms.
2) By giving the name of the project, the user can get the names of firms which are executing this project, their postal address and latest bottle necks, if any.
3) By giving the name of any item/equipment the user can know if any supplier registered with defence exists and if so, its name and address.
4) By giving the name of project and the item user can get names of firms which are involved in the project and also producess the required item.

5) By giving the name of two items/equipment, the user can get information about firms who are manufacturing these items/equipment and are registered with defence.

Many more useful reports may be generated by expanding the Retrieval program depending upon the need of user. A typical run of retrieval program is given at Appendix F.

4.12 BACK UP STRATEGY AND RECOVERY

When an updating run-unit accesses the data base, it has the potential of making damaging changes to the data base. So DBMS provides means to remove the changes made during the execution of a run unit. This is done by the use of the Journal file. A BEFORE image is a copy of a data base CBCS writes a BEFORE image of that particular page in the Journal file. For bringing back an old copy, an utility program called DBMEND is provided in the system. For decision support systems disk journal is specified as a list of commands to be given for recovery are given in Appendix D.

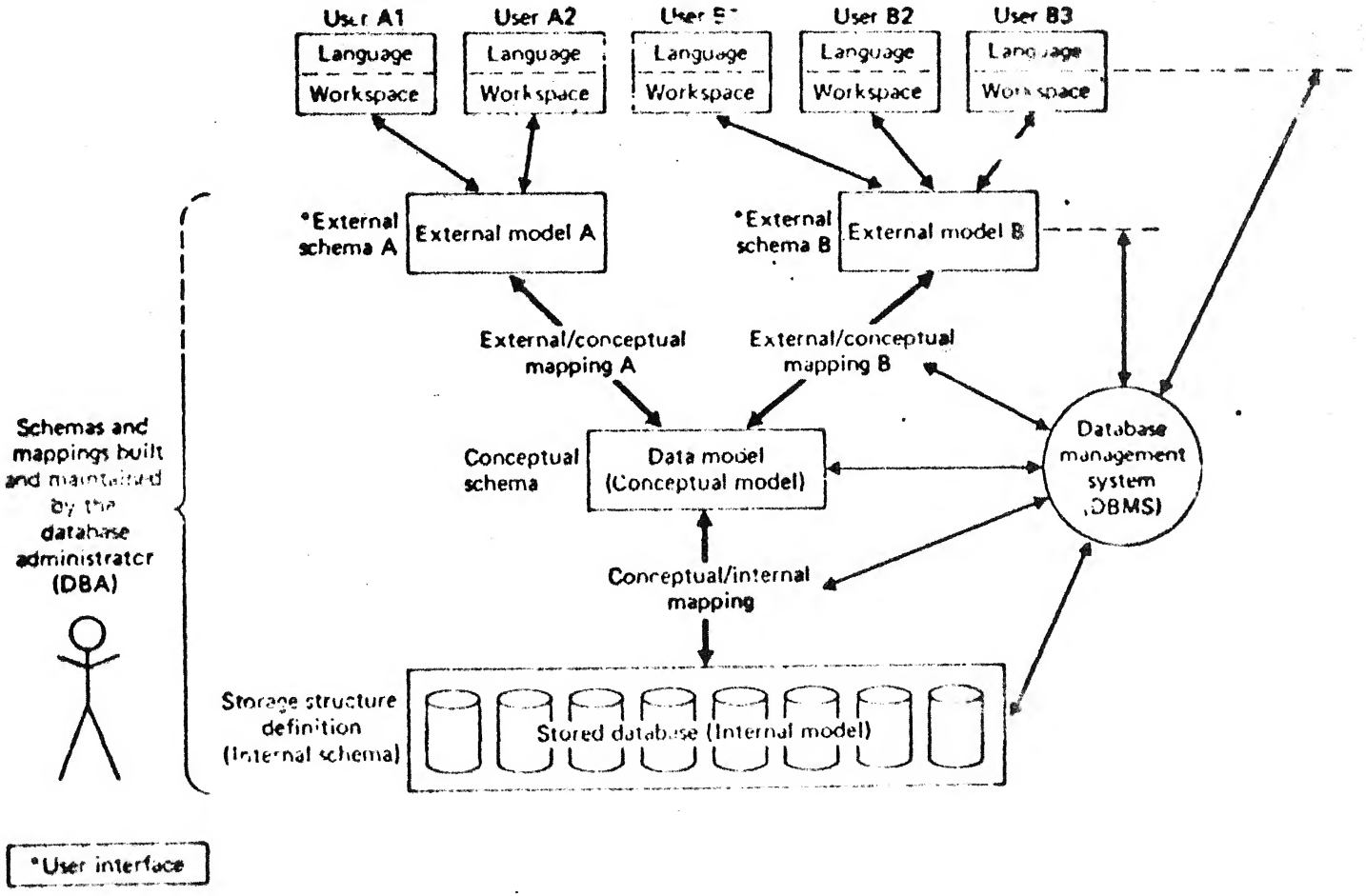
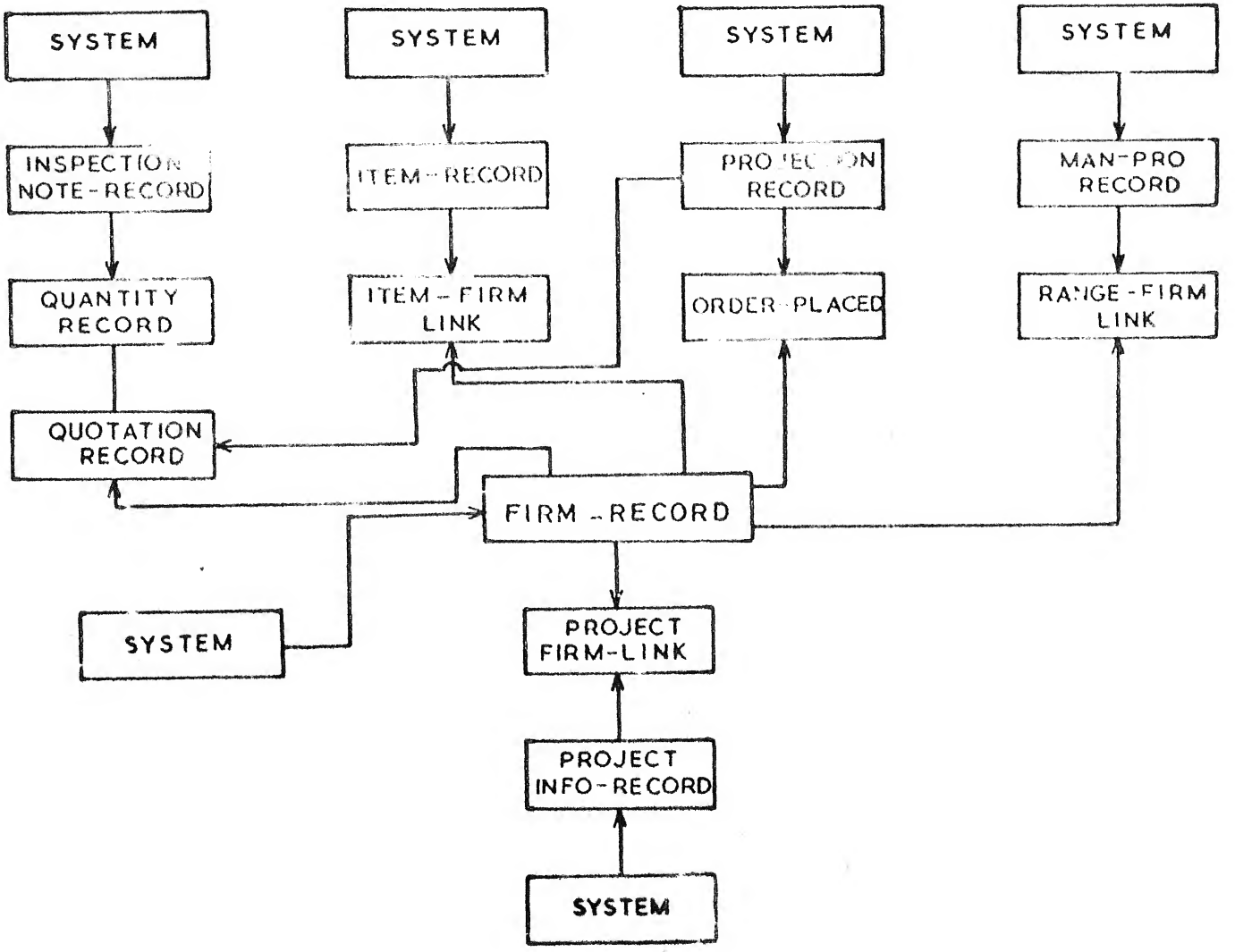


FIG.1 ARCHITECTURE FOR A DATABASE SYSTEM

DATA STRUCTURE DIAGRAM

DECISION SUPPORT SYSTEM FOR DEFENCE PROCUREMENTS



FIG·2

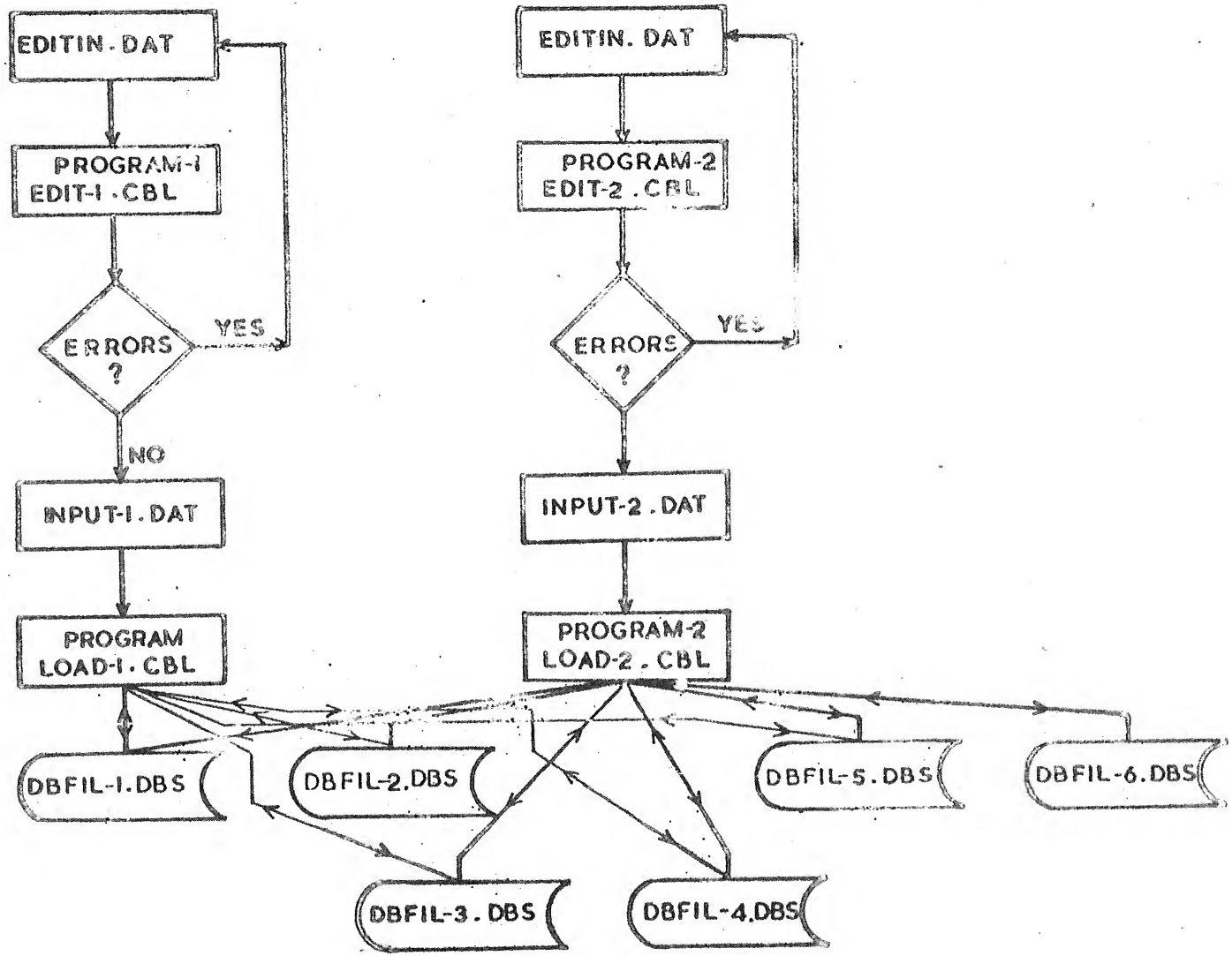


FIG. 4.1 (a) LOAD-PATH

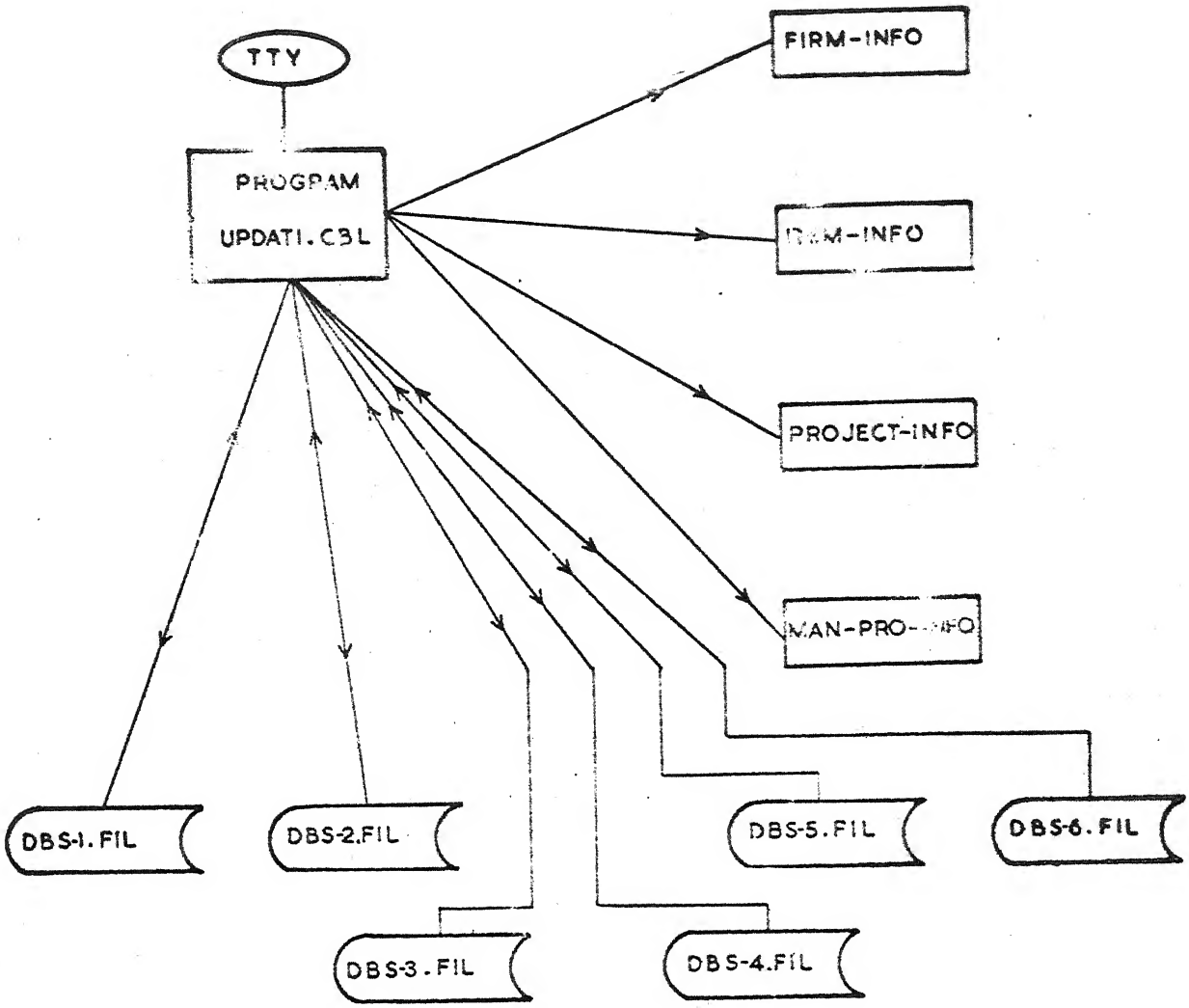


FIG. 4.1 (b) UPDATE PATH

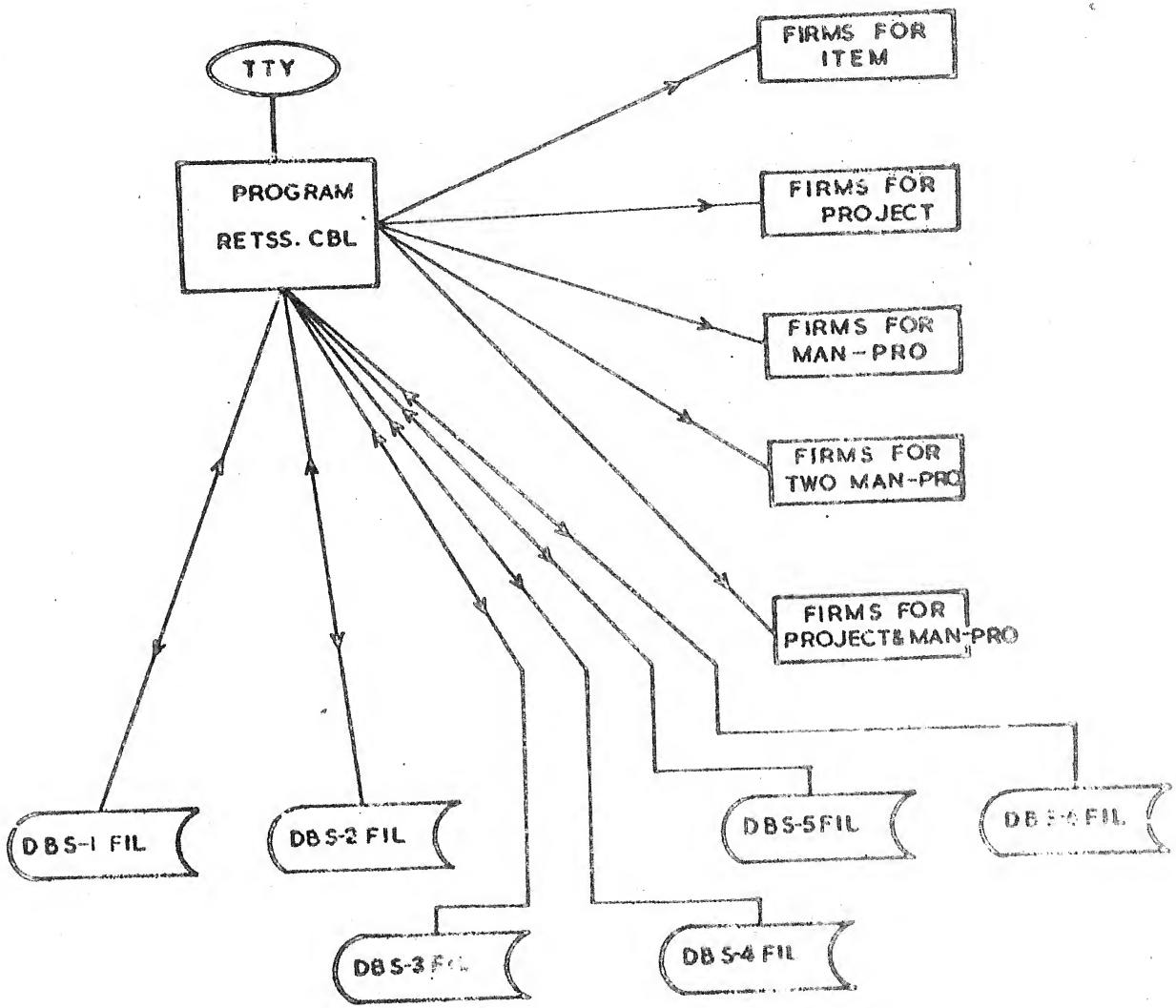


Fig. 4.1 (c) RETRIEVAL PATH

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 CONCLUSION

The basic role of a decision support system is to ensure that reliable information is generated and exchange between personnel in safe, timely and cost-effective ways. It is absolutely necessary that central control be established for decision making and monitored through all phases of the life cycle of the data base designed and developed for decision support systems.

An attempt has been made to design a decision support system for a defence organisation responsible for production and procurement of Electronic and Electrical items/equipments for defence forces.

Various loading programs for initial loading and regular updates have been developed. Various updating feature like adding a New FIRM (supplier) new item, new project, new manufacturing products have been provided.

Only one edit program is developed for validating input data (for item-record only) other edit programs could be prepared using the actual input data.

DBMS-10 package available at IIT Kanpur has been used to design and develop the decision support system. It will need minor modifications if used with other DBMS packages.

The decision support system designed ~~as~~ developed will help the organisation in generating accurate and timely reports to aid decision making. The maintenance cost of system designed will be much cheaper in terms of man power and time.

5.2 RECOMMENDATIONS FOR FURTHER WORK

The decision support system designed will be helpful in decision making for selection of competent firm for placing defence orders. The data base of the system can be expanded to include some more functions like import substitution, specification comparison, digitalisation and storing of drawing in data base.

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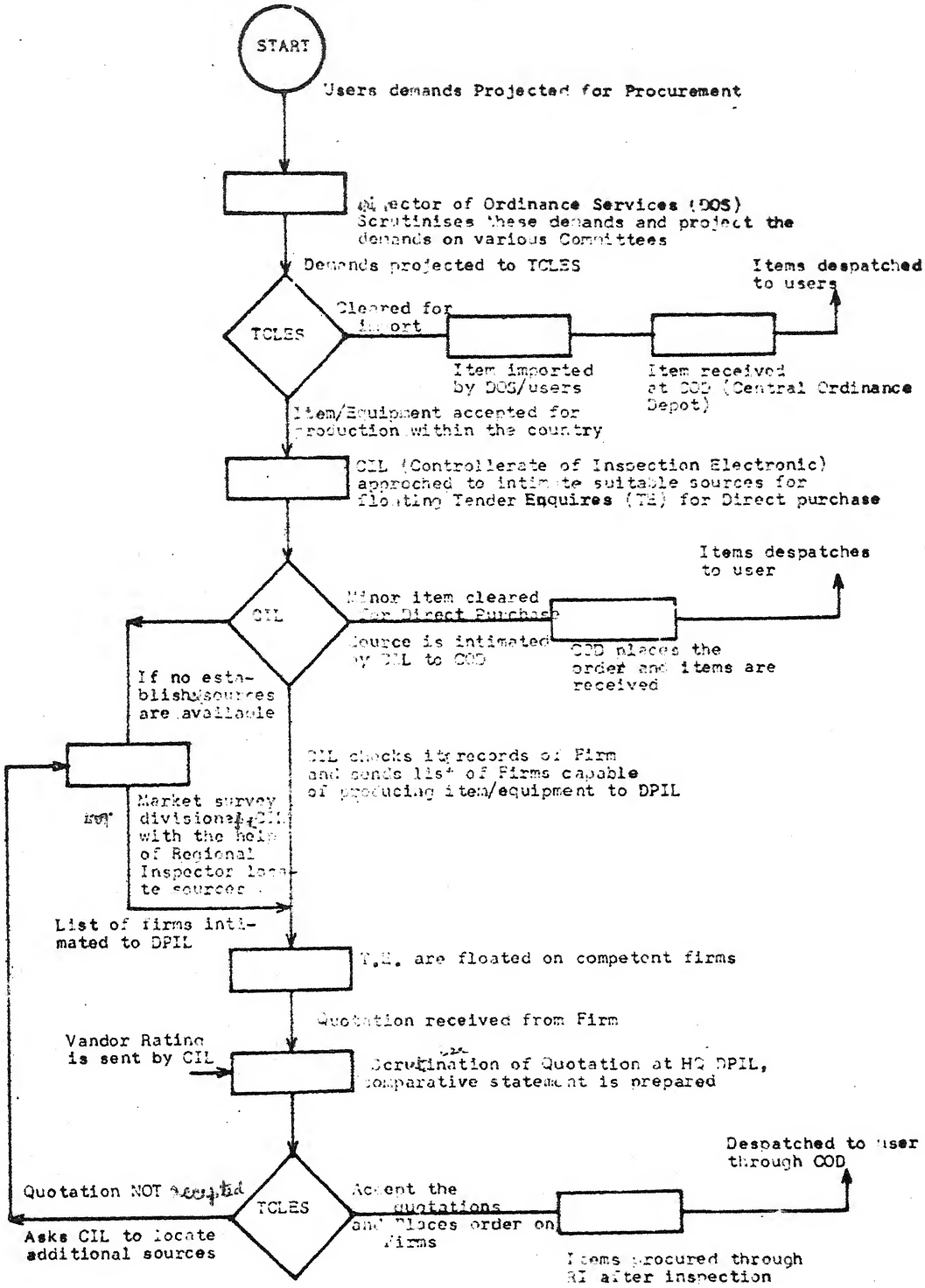
APPENDIX A

FLOW CHART OF CAPACITY ASSESSMENT OF FIRMS

CONTROL FLOW CHART OF EXISTING SYSTEM



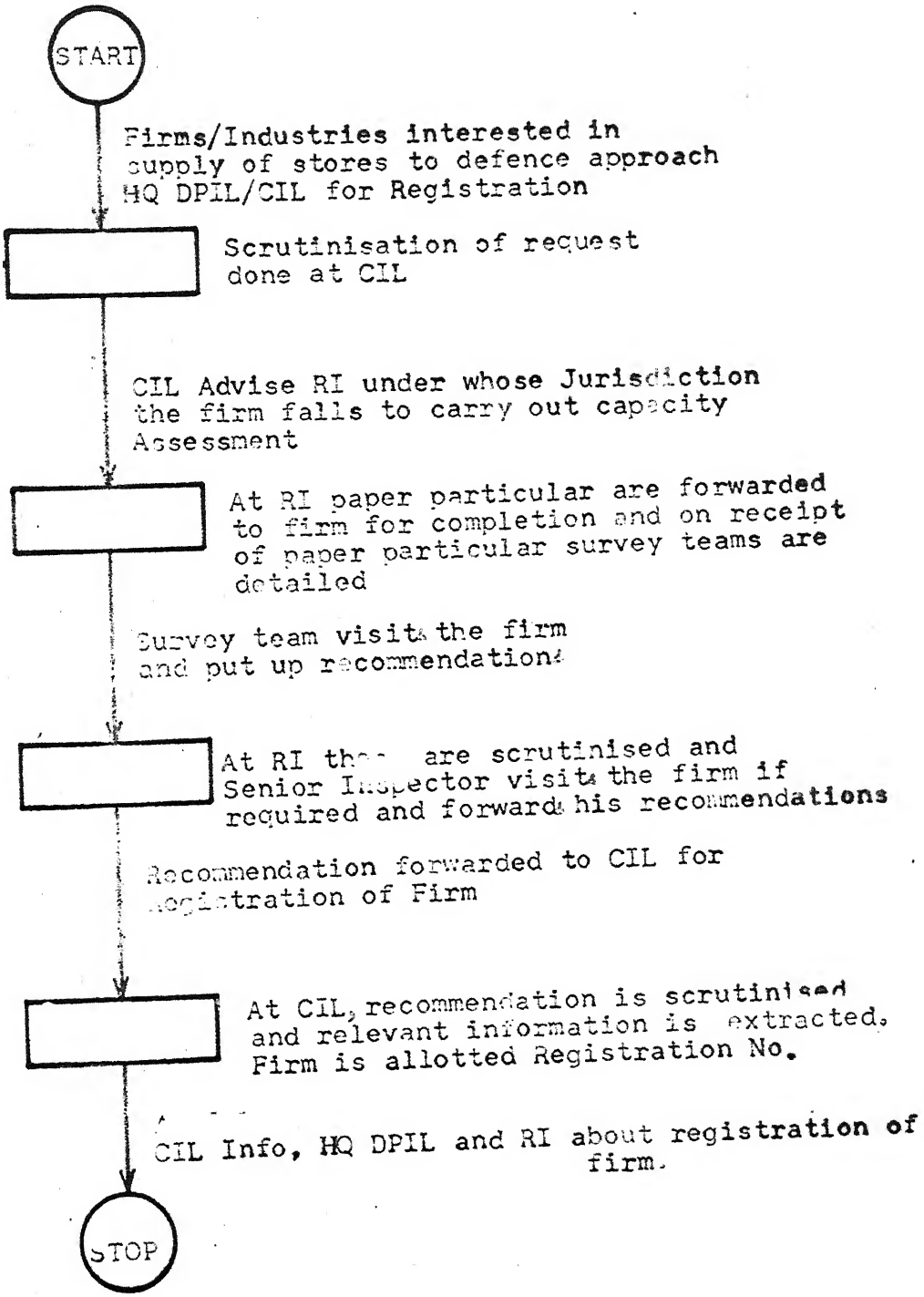
DPIL - Director of Production and Inspection Electronics

RI - Regional Inspector

TCLES- Technical Committee of Electronic and Electrical Stores

APPENDIX B

FLOW CHART OF CAPACITY ASSESSMENT OF FIRMS



```
   SCHEMA  SSABAS


IMAGES NOT IN ORDER BY COMMAND.
INTERCEPT BIND, UNANTICIPATED EXCEPTIONS.
*JOURNAL IS DSK:BACKUP
*SIZE IS 4 TRANSACTIONS.

ASSIGN INSPECTION-DETAIL-AREA TO EVAFIL
RECORDS-PER-PAGE 60
BUFFER COUNT IS 4
CALC AT MOST 4 RECORDS-PER-PAGE
*BACKUP BEFORE IMAGES
FIRST PAGE 1
LAST PAGE 20
PAGE SIZE 256 WORDS.

ASSIGN ITEM-DETAIL-AREA TO ABCFIL
RECORDS-PER-PAGE 60
BUFFER COUNT IS 4
CALC AT MOST 4 RECORDS-PER-PAGE
*BACKUP BEFORE IMAGES
FIRST PAGE 25
LAST PAGE 45
PAGE SIZE 256 WORDS.

ASSIGN PROJECT-DETAIL-AREA TO DEFFIL
RECORDS-PER-PAGE 60
BUFFER COUNT IS 4
CALC AT MOST 4 RECORDS-PER-PAGE
*BACKUP BEFORE IMAGES
FIRST PAGE 50
LAST PAGE 70
PAGE SIZE 256 WORDS.

ASSIGN PROJECTION-AREA TO SSAFIL
RECORDS-PER-PAGE 60
BUFFER COUNT IS 4
FIRST PAGE 90
LAST PAGE 110
PAGE SIZE 256 WORDS.

ASSIGN FIRM-INFO-AREA TO GHIFIL
RECORDS-PER-PAGE 60
BUFFER COUNT IS 4
CALC AT MOST 4 RECORDS-PER-PAGE
*BACKUP BEFORE IMAGES
FIRST PAGE 75
LAST PAGE 85
PAGE SIZE 256 WORDS.

ASSIGN MAN-PRO-AREA TO PQRFIL
RECORDS-PER-PAGE 60
BUFFER COUNT IS 4
```

```
CALC AT MOST 4 RECORDS-PER-PAGE
FIRST PAGE 120
LAST PAGE 140
PAGE SIZE IS 256 WORDS.

SCHEMA NAME IS SSABAS.

AREA NAME IS INSPECTION-DETAIL-AREA.
AREA NAME IS ITEM-DETAIL-AREA.

AREA NAME IS PROJECT-DETAIL-AREA.
AREA NAME IS PROJECTION-AREA.

AREA NAME IS FIRM-INFO-AREA.
AREA NAME IS MAN-PRO-AREA.

RECORD NAME IS INSPECTION-NOTE-RECORD
         LOCATION MODE IS CALC USING DIS-OF-STORE
         DUPLICATES ARE NOT ALLOWED
         WITHIN INSPECTION-DETAIL-AREA.
02       INSPECTION-NOTE-NUM                          PIC 9(8).
02       INSPECTORATE                                 PIC X(28).
02       NAME-AND-ADDRESS-OF-FIRM                     PIC X(24).
02       INDENTOR                                     PIC X(24).
02       INDENT-NO-AND-DATE                           PIC X(32).
02       CONSIGNEE                                    PIC X(12).
02       DATE-OF-INSPECTION                           PIC X(8).
02       DIS-OF-STORE                                 PIC X(24).
02       QTY-TENDER                                   PIC 9(6).
02       ACCEPTED                                     PIC 9(6).
02       TOTAL-QTY-ACCEPTED                           PIC 9(16).

RECORD NAME IS ITEM-RECORD
         LOCATION MODE IS CALC USING CAT-PAT-NO
         DUPLICATES ARE NOT ALLOWED
         WITHIN ITEM-DETAIL-AREA.
02       CAT-PAT-NO                                   PIC X(14).
02       ITEM-EQPT-DIS                                PIC X(24).

RECORD NAME IS PROJECTION-RECORD
         LOCATION MODE IS CALC USING ITEM-EQPT-DESCRIPTION
         DUPLICATES ARE NOT ALLOWED
         WITHIN PROJECTION-AREA.
02       CAT-NO                                       PIC X(14).
02       ITEM-EQPT-DESCRIPTION                        PIC X(24).
02       AGD-SRL-NO                                   PIC 9(4).
02       QTY-DEMANDED                                 PIC 9(6).
02       LAST-SOURCE-OF-SUPPLY                        PIC X(24).
02       LAST-PRO-RATE-DATE                           PIC X(20).
02       PRIORITY                                     PIC X(8).
RECORD NAME IS PROJECT-RECORD
```

```
        LOCATION MODE IS CALC USING NAME-OF-PROJECT
        DUPLICATES ARE NOT ALLOWED
        WITHIN PROJECT-DETAIL-AREA.
02      NAME-OF-PROJECT                                 PIC X(12).
02      QTY                                             PIC 9(4).
02      PROJECT-VALUE                                   PIC 9(8).
02      DATE-PROTOTYPE-REQUIRED                         PIC X(8).
02      NO-EXT-GIV-FORSUB-PROT                          PIC 9(2).
02      D-PROT-FD-FOR-EVA                               PIC X(8).
02      PROJECTION-REFERENCE                            PIC X(8).
02      PRE-SOUR-PROC-W-PRICE                           PIC X(20).
02      D-QUOT-OPEN-R-TCLEM                             PIC X(12).

RECORD NAME IS ORDER-RECORD
LOCATION MODE IS CALC USING NAME-AND-ADD-OF-FIRM
        DUPLICATES ARE NOT ALLOWED
        WITHIN FIRM-INFO-AREA.
02      ORDER-NUM                                       PIC 9(3).
02      ISSUING-AUTHORITY                               PIC X(14).
02      NAME-AND-ADD-OF-FIRM                            PIC X(24).
02      CONTR-QUOT-D                                    PIC X(12).
02      DESCRIPTION-OF-STORE                            PIC X(24).
02      DRAW-SPEC-GOV-MANUF                             PIC X(6).
02      ORDER-QTY                                       PIC 9(4).
02      PRICE                                           PIC 9(5).
02      INSPECTOR                                       PIC X(12).
02      PROJECTION-REFAGD                               PIC X(4).

RECORD NAME IS FIRM-RECORD
        LOCATION MODE IS CALC USING NAME-FIRM
        DUPLICATES ARE NOT ALLOWED
        WITHIN FIRM-INFO-AREA.
02      NAME-FIRM                               PIC X(24).
02      IMPORTENT-DEF-ITEM-PRO                  PIC X(36).
02      REMARK-OF-VISITING-OFFICER                      PIC X(24).
02      CONTROL-NUMBER-OF-CIL                           PIC X(6).
02      NATURE-AND-SIZE-OF-INDUSTRY                     PIC X.
02      FACILITY-AVAILABLE-FOR-RANDD                    PIC X(4).
02      QUALITY-CONTROL-SYSTEM                          PIC X(4).
02      TEST-CERTIFICATE                                PIC 99.
02      QUAL-APPR-CERT                                  PIC 99.
02      LIMITED-TEST-CERTIFICATES                       PIC 99.
02      FINANCIAL-POSITION                              PIC X(5).
02      CURRENT-SUPPLY-ORDER                            PIC 99.
02      NO-SUPORD-EX-WDELAY                             PIC 99.
02      SUPORD-CANC-UNSAT-PER                           PIC 99.
02      NO-OF-TIME-TE-FLOATED                           PIC 99.
02      NO-OF-QUOTATION-ACCEPTED                        PIC 99.
02      NO-OF-ORDERS-EXECUTED-BY-FIRM                   PIC 99.
02      FIRM-CODE                                       PIC X(28).
02      RATING-OF-FIRM                                  PIC X(4).
```

```
RECORD NAME IS MAN-PRO-RECORD
        LOCATION MODE IS CALC USING ITEM-EQPT
        DUPLICATES ARE NOT ALLOWED
        WITHIN MAN-PRO-AREA.
02      ITEM-EQPT                                        PIC X(24).

RECORD NAME IS QTY-RECORD
        LOCATION MODE IS CALC USING DIS-ITEM-EQPT
        DUPLICATES ARE ALLOWED
        WITHIN INSPECTION-DETAIL-AREA.
02      QTY-ON-ORDER                                PIC 9(4).
02      QTY-SUPPLIED                                PIC 9(4).
02      QTY-UNDER-INSPECTION                        PIC 9(4).
02      QTY-UND-CL-CTEST-CIL                        PIC 9(4).
02      QTY-WITHDRAWN                               PIC 9(4).
02      DIS-ITEM-EQPT                               PIC X(24).

RECORD NAME IS QUOTATION-RECORD
        LOCATION MODE IS CALC USING ITEM-EQUIPMENT-DIS
        WITHIN ITEM-DETAIL-AREA.
02      ITEM-EQUIPMENT-DIS                          PIC X(24).
02      NAME-ADDRESS-SUPPLIER                       PIC X(24).
02      QUANTITIES-SUPPLIED                         PIC 9(4).
02      RATE-AT-WHICH-SUPPLIED                              PIC X(8).
02      CAT-PAT-NUM                                         PIC X(14).
02      DIS-OF-ITEM                                         PIC X(24).
02      QUAN                                                PIC 9(4).
02      DOSINDENT-NO                                        PIC X(12).
02      LAST-PURCHASE-PRICE                                 PIC X(8).
02      DATE-PROJECTION-ACCEPTANCE                          PIC X(8).


RECORD NAME IS ITEM-FIRM-LINK
        LOCATION MODE IS DIRECT IFL-1
        WITHIN ITEM-DETAIL-AREA.
02      DUM-3           PIC X.

RECORD NAME IS PROJECT-FIRM-LINK
        LOCATION MODE IS DIRECT PFI-1
        WITHIN PROJECT-DETAIL-AREA.
02      DUM-2           PIC X.
RECORD NAME IS RANGE-FIRM-LINK
        LOCATION MODE IS DIRECT RPF-1
        WITHIN MAN-PRO-AREA.
02      MAN-SPEC                            PIC X(12).
02      RATE-PROD                           PIC X(8).

SET NAME IS PROJECTED-ITEMS
        MODE IS CHAIN
        ORDER IS SORTED
```

```
        DUPLICATES ARE NOT ALLOWED
        OWNER IS ITEM-RECORD
        MEMBER IS PROJECTION-RECORD
        MANDATORY AUTOMATIC
        ASCENDING KEY IS ITEM-EQPT-DESCRIPTION.

SET NAME IS PROJECT-PROJECTIONS
        MODE IS CHAIN
        ORDER IS SORTED
        DUPLICATES ARE ALLOWED
        OWNER IS PROJECT-RECORD
        MEMBER IS PROJECTION-RECORD
        OPTIONAL MANUAL
        ASCENDING KEY IS ITEM-EQPT-DESCRIPTION.

SET NAME IS ALL-ITEM
        MODE IS CHAIN
        ORDER IS SORTED
        DUPLICATES ARE NOT ALLOWED
        OWNER IS SYSTEM
        MEMBER IS ITEM-RECORD
        MANDATORY AUTOMATIC
        ASCENDING KEY IS ITEM-EQPT-DIS.

SET NAME IS ALL-INSPECTION-NOTES
        MODE IS CHAIN
        ORDER IS SORTED
        DUPLICATES ARE NOT ALLOWED
        OWNER IS SYSTEM
        MEMBER IS INSPECTION-NOTE-RECORD
        MANDATORY AUTOMATIC
        ASCENDING KEY IS INSPECTION-NOTE-NUM.

SET NAME IS ALL-PROJECTS
        MODE IS CHAIN
        ORDER IS SORTED
        DUPLICATES ARE NOT ALLOWED
        OWNER IS SYSTEM
        MEMBER IS PROJECT-RECORD
        MANDATORY AUTOMATIC
        ASCENDING KEY IS PROJECTION-REFERENCE.

SET NAME IS ALL-FIRM
        MODE IS CHAIN
        ORDER IS SORTED
        DUPLICATES ARE NOT ALLOWED
        OWNER IS SYSTEM
        MEMBER IS FIRM-RECORD
        MANDATORY AUTOMATIC
        ASCENDING KEY IS NAME-FIRM.
```

```
SET NAME IS ALL-PROJECTIONS
        MODE IS CHAIN
        ORDER IS SORTED
        DUPLICATES ARE ALLOWED
        OWNER IS SYSTEM
        MEMBER IS PROJECTION-RECORD
        MANDATORY AUTOMATIC
        ASCENDING KEY IS ITEM-EQPT-DESCRIPTION.

SET NAME IS COMPARATIVE-STATE
        MODE IS CHAIN
        ORDER IS SORTED
        DUPLICATES ARE NOT ALLOWED
        OWNER IS FIRM-RECORD
        MEMBER IS QUOTATION-RECORD
        MANDATORY AUTOMATIC
        ASCENDING KEY IS ITEM-EQUIPMENT-DIS.

SET NAME IS ITEM-FIRM
        MODE IS CHAIN
        ORDER IS ALWAYS LAST
        OWNER IS ITEM-RECORD
        MEMBER IS ITEM-FIRM-LINK
                MANDATORY AUTOMATIC
                        SET SELECTION CURRENT.

SET NAME IS PROJECT-FIRM
        MODE IS CHAIN
        ORDER IS ALWAYS LAST
        OWNER IS PROJECT-RECORD
        MEMBER IS PROJECT-FIRM-LINK
        MANDATORY AUTOMATIC
        SET SELECTION CURRENT.

SET NAME IS INSPECTION-DATA
        MODE IS CHAIN
        ORDER IS SORTED
        DUPLICATES ARE ALLOWED
        OWNER IS INSPECTION-NOTE-RECORD
        MEMBER IS QTY-RECORD
        MANDATORY MANUAL
        ASCENDING KEY IS DIS-ITEM-EQPT.

SET NAME IS ORDER-PLACED
        MODE IS CHAIN
        ORDER IS SORTED
        DUPLICATES ARE NOT ALLOWED
        OWNER IS PROJECTION-RECORD
        MEMBER IS ORDER-RECORD
        MANDATORY AUTOMATIC
        ASCENDING KEY IS NAME-AND-ADD-OF-FIRM.
```

```
SET NAME IS PROJECTION-MATERIALISATION
        MODE IS CHAIN
        ORDER IS SORTED
        DUPLICATES ARE NOT ALLOWED
        OWNER IS PROJECTION-RECORD
        MEMBER IS QUOTATION-RECORD
        MANDATORY AUTOMATIC
        ASCENDING KEY IS ITEM-EQUIPMENT-DIS.
SET NAME IS COMPARATIVE-STATEMENT
        MODE IS CHAIN
        ORDER IS SORTED
        OWNER IS QUOTATION-RECORD
        MEMBER IS QTY-RECORD
        MANDATORY AUTOMATIC
        SET SELECTION CURRENT.
SET NAME IS FIRM-CURRENT-ORDERS
        MODE IS CHAIN
        ORDER IS SORTED
        DUPLICATES ARE  ALLOWED
        OWNER IS FIRM-RECORD
        MEMBER IS ORDER-RECORD
        MANDATORY AUTOMATIC
        ASCENDING KEY IS NAME-AND-ADD-OF-FIRM.

SET NAME IS ALL-MAN-PRO
        MODE IS CHAIN
        ORDER IS SORTED
        DUPLICATES ARE NOT ALLOWED
        OWNER IS SYSTEM
        MEMBER IS MAN-PRO-RECORD
        MANDATORY AUTOMATIC
        ASCENDING KEY IS ITEM-EQPT.

SET NAME IS FIRM-ITEM
        MODE IS CHAIN
        ORDER IS ALWAYS LAST
        OWNER IS FIRM-RECORD
        MEMBER IS ITEM-FIRM-LINK
        MANDATORY AUTOMATIC
        SET SELECTION CURRENT.

SET NAME IS FIRM-MAN-PRO
        MODE IS CHAIN
        ORDER IS ALWAYS LAST
        OWNER IS FIRM-RECORD
        MEMBER IS RANGE-FIRM-LINK
        MANDATORY AUTOMATIC
        SET SELECTION CURRENT.

SET NAME IS FIRM-PROJECT
```

```
        MODE IS CHAIN
        ORDER IS ALWAYS LAST
        OWNER IS FIRM-RECORD
        MEMBER IS PROJECT-FIRM-LINK
        MANDATORY AUTOMATIC
        SET SELECTION CURRENT.

SET NAME IS MAN-PRO
        MODE IS CHAIN
        ORDER IS ALWAYS LAST
        OWNER IS MAN-PRO-RECORD
        MEMBER IS RANGE-FIRM-LINK
                MANDATORY AUTOMATIC
                SET SELECTION CURRENT.


SUB-SCHEMA NAME IS SOS
        PRIVACY LOCK IS LETHAL.

AREA SECTION.
         COPY ALL AREAS.

RECORD SECTION.
         COPY ALL RECORDS .

SET SECTION.
       . COPY ALL SETS .

END-SCHEMA.
```

APPENDIX D

RECOVERY OF DATA BASE

```
.R DBMEND
 /Journal BAKUP: JRN
 /OPEN 'INSPECTION-DETAIL-AREA'
 /OPEN 'ITEM-DETAIL-AREA'
 /OPEN 'PROJECT-DETAIL-AREA'
 /OPEN 'PROJECTION-AREA'
 /OPEN 'FIRM-INFO-AREA'
 /OPEN 'MAN-PRO-AREA'
 /START
 /END
 /MERGE BEFORE
 /CLOSE ALL
 /UNLOAD
 /CONTROL Z .
```

A TYPICAL RUN OF UPDATE PROGRAM

```
 EX TEST7A.CBL
COBOL:  UPDAT1  [TEST7A.CBL]
LINK:   Loading
[LNKXCT UPDAT1 execution]
IF EXECUTION TERMINATES ABRUPTLY,THEN GIVE FULLOWING
COMMAND IN MONITERX MODE
DO MEG.MIC
TYPE 1 IF YOU WISH TO ADD NEW FIRM:
TYPE 2 IF YOU WANT TO DELETE FIRM:1
TYPE NAME-FIRM IN X(24):AHLUWALIA PVT LTD KANPUR
IMPORTENT-DEF-ITEM-PRO INX36:GEN SET 15KVA,19KVA,BTY CHARGERS
GIVE REMARKS-OF-VISITING-OFFICER IN X24:REC FOR BULK ORDERS
TYPE CONTROAL-NO-OF-CIL ALLOTED IN X6:CIL-11
NATURE-AND-SIZE-OF-INDUSTRY X:L
TYPE R AND D FACILITIES AVAILABLE WITH THE FIRM IN X4:GOOD
TYPE QUALITY -CONTROL-SYSTEM OF FIRM X4:GOOD
TEST-CERTIFICATES HELD BY FIRM 99:10
GIVE NO OF QUALIFICATION-APPROVAL-CERTIFICATES
HELD BY FIRM:2
GIVE NUM-TEST-CERTIFICATES-HELD BY FIRM 99:12
GIVE FINANCIAL-POSITION OF THE FIRM IN X(6) CH:SOUND
GIVE NUMBER OF CURRENT-SUPPLY-ORDER
EXISTING WITH THE FIRM:23
GIVE NO OF ORDER EXECUTED WITH DELAY IN 99:2
NO OF ORDER CANCELLED DUE UNSAT PERFORMANCE IN 99:2
NO-OF-TIME-TE-FLOTED IN 99:3
GIVE NO OF QUOT ACCEPTED IN 99:6
GIVE NO OF ORDER EXECUTED BY FIRM IN 99:10
TYPE FIRM-CODE IN X(28):EA1-I1R2Q2D1F2/M8 N6/S403P1
GIVE RATING-OF-FIRM IN X(4):7
DO YOU WISH TO CORRECT ENTRIES IN RECORD
TYPE Y
ELSE TYPE N:N
```

```
GIVE  NAME-OF-PROJECT X(12):GENERATING
GIVE  QTY 4CH:200
GIVE  PROJECT-VALUE IN 8CH:205000
GIVE  DATE-PROTOTYPE-REQUIRED X(8):29ET81
NO-EXT-GIV-FORSUB-PROT IN 2CH:3
D-PROT-FD-FOR-EVA IN 8CH:3OCT82
PROJECTION-REFERENCE IN X(8):MAR83
PRE-SOUR-PROC W-PRICE X(20):IMPORTED USA $.2M
D-QUOT-OPEN-R-TCLEM IN X(12):05-07-816/82
DO YOU WISH TO CORRECT ENTRIES IN RECORD:
TYPE Y ELSE TYPE N:Y
GIVE  NAME-OF-PROJECT X(12):GEN SETIA
GIVE  QTY 4CH:200
GIVE  PROJECT-VALUE IN 8CH:200000
GIVE  DATE-PROTOTYPE-REQUIRED X(8):09-09-81
NO-EXT-GIV-FORSUB-PROT IN 2CH:3
D-PROT-FD-FOR-EVA IN 8CH:08-07-82
PROJECTION-REFERENCE IN X(8):SEP81
PRE-SOUR-PROC-W-PRICE X(20):IMPORTED USA $.3M
D-QUOT-OPEN-R-TCLEM IN X(12):08 05-80
DO YOU WISH TO CORRECT ENTRIES IN RECORD:
TYPE Y ELSE TYPE N:N
TYPE Y IF YOU HAVE MORE PROJECTS TO ADD
 TYPE N OTHERWISE:N
GIVE CAT-PAT-NO IN X(14):Z32/0018001234
GIVE ITEM-EQPT-DIS IN X(24), GIVING ONE BLANK EX 2A
THIS IS NEW ITEM/EQPT SO PLEASE TYPE
ITEM-SPEC GIVING ONE BLANK: CIL-6/

TYPE Y IF YOU HAVE MORE ITEMS TO ADD
 TYPE N OTHERWISE:Y
```

```
GIVE CAT-PAT-NO IN X(14):Z31/00180012345
GIVE ITEM-EQPT-DIS IN X(24); GIVING ONE BLANK:EXCHANGE 7A
THIS IS NEW ITEM/EQPT SO PLEASE TYPE
ITEM-SPEC GIVING ONE BLANK:CIL-8
TYPE Y IF YOU HAVE MORE ITEMS TO ADD
 TYPE N OTHERWISE:Y
GIVE CAT-PAT-NO IN X(14):Z3/00018001234
GIVE ITEM-EQPT-DIS IN X(24); GIVING ONE BLANK:CHANGE 10% INES2A
THIS IS NEW ITEM/EQPT SO PLEASE TYPE
ITEM-SPEC GIVING ONE BLANK:CIL-678
TYPE Y IF YOU HAVE MORE ITEMS TO ADD
 TYPE N OTHERWISE:N
ITEM-EQPT IN X(24):GEN SET 15KVA
GIVE MAN-SPEC X(12):MIL-78
GIVE RATE OF PRODUCTION X(8):300S/M
DO YOU WISH TO CORRECT ENTRIES IN THE RECORD
TYPE Y ELSE TYPE N:
N
TYPE Y IF YOU HAVE MORE MAN-PROS TO ADD
 TYPE N OTHERWISE:Y
ITEM-EQPT IN X(24):GEN SET 19KVA
GIVE MAN-SPEC X(12):MIL-98
GIVE RATE OF PRODUCTION X(8):100S/M
DO YOU WISH TO CORRECT ENTRIES IN THE RECORD
TYPE Y ELSE TYPE N:
N
TYPE Y IF YOU HAVE MORE MAN-PROS TO ADD
 TYPE N OTHERWISE:N
 UPDATING IS SUCCESSFUL
TYPE Y IF YOU WISH TO INSERT OR DELETE ANY MORE RECORDS
ELSE TYPE N:N
UPDATING IS SUCCESSFUL

EXIT
```

APPENDIX F

A TYPICAL RUN OF RETRIEVAL PROGRAM

```
 EX S.ISS5.CBL
LINK:   Loading
[LNKXCT RTRVAL execution]

TYPE Y IF OUTPUT ON TTY IS REQUIRED ELSE TYPE N :Y

TYPE 1 IF FIRMS FOR EXISTING DEFENCE PROJECT ARE WANTED

TYPE 2 IF YOU WANT TO KNOW ABOUT THE FIRM WHO HAD SUPLIED A PARTICULAR ITEM TO D
EFENCE

TYPE 3 IF FIRMS REGISTERED WITH DEF AND PRODUCING THE DESIRED ITEM IS REQD

TYPE 4 IF FIRMS FOR TWO PARTICULAR DESIRED ITEMS ARE REQUIRED

TYPE 5 IF FIRMS HAVING A DEFENCE PROJECT AND PRODUCING  A ITEM IS REQRED:1
TYPE NAME-OF-PROJECT:RADIO SET XX
 1SEMI CONDUCTORS LTD CHG3LA2-I1R2Q2D2F2/N4 M4/S103P1 015.00
 2BHARAT ELECTRONICS BG-22LA1-I2R2Q2D1F2/N7 M7/S205P0 027.00

 THE REQESTED INFORMATION IS IN FILE INFORM.FIL
IF YOU WANT MORE-INFORMATION TYPE Y
ELSE TYPE N:N
Y

TYPE 1 IF FIRMS FOR EXISTING DEFENCE PROJECT ARE WANTED

TYPE 2 IF YOU WANT TO KNOW ABOUT THE FIRM WHO HAD SUPLIED A PARTICULAR ITEM TO D
EFENCE

TYPE 3 IF FIRMS REGISTERED WITH DEF AND PRODUCING THE DESIRED ITEM IS REQD

TYPE 4 IF FIRMS FOR TWO PARTICULAR DESIRED ITEMS ARE REQUIRED

TYPE 5 IF FIRMS HAVING A DEFENCE PROJECT AND PRODUCING  A ITEM IS REQRED:2
TYPE CAT-PAT-NO :Z1/00018001234
 1ERRICSON INDIA LTD CAL22LA1-I1R2Q2D3F2/N7 M5/S303P1 EXCHANGE 15LINES1A,50LINES
2A,100LINE
 2P&T FACTORY BOMBAY-46   LA1-I1R2Q2D3F2/N7 M5/S303P1 EXCHANGE 15LINES1A,50LINES
2A,100LINE
 3INTRUMENTATION LTD KOTA EA2-I2R2Q2D3F2/N4 M2/S303P1 EXCHANGE 15LINES2A,50LINES
2A,100LINE

 THE REQESTED INFORMATION IS IN FILE INFORM.FIL
IF YOU WANT MORE-INFORMATION TYPE Y
ELSE TYPE N:Y

TYPE 1 IF FIRMS FOR EXISTING DEFENCE PROJECT ARE WANTED

TYPE 2 IF YOU WANT TO KNOW ABOUT THE FIRM WHO HAD SUPLIED A PARTICULAR ITEM TO D
EFENCE

TYPE 3 IF FIRMS REGISTERED WITH DEF AND PRODUCING THE DESIRED ITEM IS REQD

TYPE 4 IF FIRMS FOR TWO PARTICULAR DESIRED ITEMS ARE REQUIRED

TYPE 5 IF FIRMS HAVING A DEFENCE PROJECT AND PRODUCING  A ITEM IS REQRED:1
TYPE NAME-OF-PROJECT:GEN SET 2A

THIS PROJECT NAME DOSE NOT EXIST
IF YOU WANT MORE-INFORMATION TYPE Y
ELSE TYPE N:Y
```

```
TYPE 1 IF FIRMS FOR EXISTING DEFENCE PROJECT ARE WANTED

TYPE 2 IF YOU WANT TO KNOW ABOUT THE FIRM WHO HAD SUPLIED A PARTICULAR ITEM TO D
EFENCE

TYPE 3 IF FIRMS REGISTERED WITH DEF AND PRODUCING THE DESIRED ITEM IS REQD

TYPE 4 IF FIRMS FOR TWO PARTICULAR DESIRED ITEMS ARE REQUIRED

TYPE 5 IF FIRMS HAVING A DEFENCE PROJECT AND PRODUCING  A ITEM IS REQRED:4
TYPE THE MAN-PRO:EXCHANGE 50LINES.
TYPE SECOND MAN-PRO:EXCHANGE 15LINE LED
 1ERRICSON INDIA LTD CAL22I A1-I1R2Q2D3F2/N7 M5/S303P1 EXCHANGE 15LINES1A,50LINES
2A,100LINE
 2P&T FACTORY BOMBAY-46   LA1-I1R2Q2D3F2/N7 M5/S303P1 EXCHANGE 15LINES1A,50LINES
2A,100LINE
 3INTRUMENTATION LTD KOTA EA2-I2R2Q2D3F2/N4 M2/S303P1 EXCHANGE 15LINES2A,50LINES
2A,100LINE

 THE REQESTED INFORMATION IS IN FILE INFORM.FIL
IF YOU WANT MORE-INFORMATION TYPE Y
ELSE TYPE N:5
IF YOU WANT MORE-INFORMATION TYPE Y
ELSE TYPE N:Y

TYPE 1 IF FIRMS FOR EXISTING DEFENCE PROJECT ARE WANTED

TYPE 2 IF YOU WANT TO KNOW ABOUT THE FIRM WHO HAD SUPLIED A PARTICULAR ITEM TO D
EFENCE

TYPE 3 IF FIRMS REGISTERED WITH DEF AND PRODUCING THE DESIRED ITEM IS REQD

TYPE 4 IF FIRMS FOR TWO PARTICULAR DESIRED ITEMS ARE REQUIRED

TYPE 5 IF FIRMS HAVING A DEFENCE PROJECT AND PRODUCING  A ITEM IS REQRED:5
TYPE THE MAN-PRO:RADIO SET40WATTS
TYPE NAME OF PROJECTRADIO SET XX
MAN-PRO DOES NOT EXIST
IF YOU WANT MORE-INFORMATION TYPE Y
ELSE TYPE N:Y

TYPE 1 IF FIRMS FOR EXISTING DEFENCE PROJECT ARE WANTED

TYPE 2 IF YOU WANT TO KNOW ABOUT THE FIRM WHO HAD SUPLIED A PARTICULAR ITEM TO D
EFENCE

TYPE 3 IF FIRMS REGISTERED WITH DEF AND PRODUCING THE DESIRED ITEM IS REQD

TYPE 4 IF FIRMS FOR TWO PARTICULAR DESIRED ITEMS ARE REQUIRED

TYPE 5 IF FIRMS HAVING A DEFENCE PROJECT AND PRODUCING  A ITEM IS REQRED:5
TYPE THE MAN-PRO:RADIO SET400WATTS
TYPE NAME OF PROJECTRADIO SET XX
MAN-PRO DOES NOT EXIST
IF YOU WANT MORE-INFORMATION TYPE Y
ELSE TYPE N:Y
```

```
TYPE 1 IF FIRMS FOR EXISTING DEFENCE PROJECT ARE WANTED

TYPE 2 IF YOU WANT TO KNOW ABOUT THE FIRM WHO HAD SUPLIED A PARTICULAR ITEM TO D
EFENCE

TYPE 3 IF FIRMS REGISTERED WITH DEF AND PRODUCING THE DESIRED ITEM IS REQD

TYPE 4 IF FIRMS FOR TWO PARTICULAR DESIRED ITEMS ARE REQUIRED

TYPE 5 IF FIRMS HAVING A DEFENCE PROJECT AND PRODUCING  A ITEM IS REQRED:5
TYPE THE MAN-PRO:RADIO SET 400WATTS
TYPE NAME OF PROJECTRADIO SET XX
 1BHARAT ELECTRONICS BG-22LA1-I2R2Q2D1F2/N7 M7/S205P0

 THE REQESTED INFORMATION IS IN FILE INFORM.FIL
IF YOU WANT MORE-INFORMATION TYPE Y
ELSE TYPE N:Y

TYPE 1 IF FIRMS FOR EXISTING DEFENCE PROJECT ARE WANTED

TYPE 2 IF YOU WANT TO KNOW ABOUT THE FIRM WHO HAD SUPLIED A PARTICULAR ITEM TO D
EFENCE

TYPE 3 IF FIRMS REGISTERED WITH DEF AND PRODUCING THE DESIRED ITEM IS REQD

TYPE 4 IF FIRMS FOR TWO PARTICULAR DESIRED ITEMS ARE REQUIRED

TYPE 5 IF FIRMS HAVING A DEFENCE PROJECT AND PRODUCING  A ITEM IS REQRED:2
TYPE CAT-PAT-NO :Z2/00021900234
 1ERRICSON INDIA LTD CAL22LA1-I1R2Q2D3F2/N7 M5/S303P1 EXCHANGE 15LINES1A,50LINES
2A,100LINE
 2P&T FACTORY BOMBAY-46   LA1-I1R2Q2D3F2/N7 M5/S303P1 EXCHANGE 15LINES1A,50LINES
2A,100LINE
 3INTRUMENTATION LTD KOTA EA2-I2R2Q2D3F2/N4 M2/S303P1 EXCHANGE 15LINES2A,50LINES
2A,100LINE

 THE REQESTED INFORMATION IS IN FILE INFORM.FIL
IF YOU WANT MORE-INFORMATION TYPE Y
ELSE TYPE N:N

EXIT
```

APPENDIX C

FIRMS FOR: RADIO SET XX

NO	NAME-FIRM	FIRM-CODE	EXISTING ORDERS ON FIRM	RATING-OF-FIRM
1	SEMI CONDUCTORS LTD CHG3	LA2-I1R2Q2D2F2/N6 M4/S103P1	01	5.00
2	BHARAT ELECTRONICS BG-22	LA1-I2R2Q2D1F2/N7 M7/S205P0	02	7.00

FIRMS FOR Z1/00018001234 EXCHANG15LINEELECTRONIC

NO	NAME-FIRM	FIRM-CODE	IMP-DEFENCE ITEM MANUFACTURED
1	ERRICSON INDIA LTD CAL22	LA1-I1R2Q2D3F2/N7 M5/S303P1	EXCHANGE 15LINES1A,50LINES2A,100LINE
2	P&T FACTORY BOMBAY-46	LA1-I1R2Q2D3F2/N7 M5/S303P1	EXCHANGE 15LINES1A,50LINES2A,100LINE
3	INTRUMENTATION LTD KOTA	EA2-I2R2Q2D3F2/N4 M2/S30[illegible]	EXCHANGE 15LINES2A,50LINES2A,100LINE

FIRMS FOR Z2/00021900234 MULTIPLE UNIT ELECTRONIC

NO	NAME-FIRM	FIRM-CODE	IMP-DEFENCE ITEM MANUFACTURED
1	ERRICSON INDIA LTD CAL22	LA1-I1R2Q2D3F2/N7 M5/S303P1	EXCHANGE 15LINES1A,50LINES2A,100LINE
2	P&T FACTORY BOMBAY-46	LA1-I1R2Q2D3F2/N7 M5/S303P1	EXCHANGE 15LINES1A,50LINES2A,100LINE
3	INTRUMENTATION LTD KOTA	EA2-I2R2Q2D3F2/N4 M2/S303P1	EXCHANGE 15LINES2A,50LINES2A,100LINE

FIRMS FOR MAN-PRO: GEN SET 15KVA

NO	NAME-FIRM	FIRM-CODE	IMP-DEFENCE ITEM MANUFACTURED
1	AHLUWALIA PVT LTD KANPUR	EA1-I1R2Q2D1F2/M8 N6/S403P1	GEN SET 15KVA,19KVA,BTY CHARGERS

```
IDENTIFICATION DIVISION.
PROGRAM-ID. LOAD.
AUTHOR. SSA.

ENVIRONMENT DIVISION.
INPUT-OUTPUT SECTION.
FILE-CONTROL.
        SELECT LOAD-FILE ASSIGN TO DSK
                RECORDING MODE IS ASCII.

DATA DIVISION.
FILE SECTION.
FD LOAD-FILE
        VALUE OF ID IS 'INPUT DAT'.
01      LOAD-RECORD                     PIC X(15
SCHEMA SECTION.
        INVOKE SUB-SCHEMA SOS OF SCHEMA
        PRIVACY KEY FOR COMPILE IS LETHA
WORKING-STORAGE SECTION.
77      FIRST-TIME                      PIC 9.
77      SUCCEED                         PIC X(5)
77      END-OF-FILE                     PIC X(5)
77      END-PROJECT-RECORD
77      END-MAN-PRJ-RECORD
77      END-ITEM                        PIC X(5)
77      END-RANGE-FIRM-LINK             PIC X(5)

01      ITEM-RECORD-1.
        02      C-P-NO-1                PIC X(38
        02      FILLER                  PIC X(11
01      FIRM-RECORD-1.
        02      FIM-1                   PIC X(15
        02      FILLER                  PIC X(1).
01      PROJECT-RECORD-1.
        02      P-I-R-1                 PIC X(82
        02      FILLER                  PIC X(73
01      MAN-PRO-RECORD-1.
        02      MAN-1                   PIC X(24
        02      FILLER                  PIC X(13
01      RANGE-FIRM-LINK-1.
        02      RAN-1                   PIC X(20
        02      FILLER                  PIC X(13
PROCEDURE DIVISION.
MAIN-PROGRAM SECTION.
MAIN-PROGRAM-ENTRY.
        OPEN INPUT LOAD-FILE.
        PERFORM AREAS-OPENING.
        MOVE 'FALSE' TO END-OF-FILE.
        DISPLAY ' '.
        DISPLAY 'IF EXECUTION TERMINATES,
        DISPLAY 'COMMAND IN MONITOR MODE'
```

```
                    STORE ITEM-FIRM-LINK
                    ELSE
                              STORE ITEM-FIRM-LINK
                    ELSE
                              NEXT SENTENCE.
ITEM-RECORD-STORING-EXIT.EXIT.

FIRM-RECORD-STORING SECTION.
FIRM-RECORD-STORING-ENTRY.
          READ LOAD-FILE
                    AT END MOVE 'TRUE' TO END-OF-FILE
                              GO TO FIRM-RECORD-STORING-EXIT.
                    MOVE LOAD-RECORD TO FIRM-RECORD-1
                    MOVE FIM-1 TO FIRM-RECORD.
                    STORE FIRM-RECORD.
FIRM-RECORD-STORING-EXIT. EXIT.
PROJECT-RECORD-STORING SECTION.
PROJECT-RECORD-STORING-ENTRY.
          READ LOAD-FILE
                    AT END MOVE 'TRUE' TO END-OF-FILE
                              GO TO PROJECT-RECORD-STORING-EXIT.
          MOVE LOAD-RECORD TO PROJECT-RECORD-1 PROJECT-RECORD.
          IF P-I-R-1 = '**'
                    MOVE 'TRUE' TO END-PROJECT-RECORD
                    GO TO PROJECT-RECORD-STORING-EXIT.
          FIND PROJECT-RECORD.
          IF ERROR-COUNT GREATER THAN 0
          STORE PROJECT-RECORD
          STORE PROJECT-FIRM-LINK
          ELSE
                    STORE PROJECT-FIRM-LINK.
PROJECT-RECORD-STORING-EXIT.EXIT.
MAN-PRO-RECORD-STORING SECTION.
MAN-PRO-RECORD-STORING-BEGIN.

          READ LOAD-FILE
                    AT END MOVE 'TRUE' TO END-OF-FILE END-MAN-PRO-RECORD.
          IF
                    END-OF-FILE = 'FALSE'
                    MOVE LOAD-RECORD TO MAN-1
                    IF
                              MAN-1 = '***'
                              MOVE 'TRUE' TO END-MAN-PRO-RECORD END-OF-FILE
                    ELSE
                              MOVE MAN-1 TO MAN-PRO-RECORD
                    FIND MAN-PRO-RECORD
                    IF ERROR-STATUS = 0326
                    STORE MAN-PRO-RECORD
                    PERFORM RANGE-FIRM-LINK-STORING
                    ELSE
                              PERFORM RANGE-FIRM-LINK-STORING
```

```
           ELSE
                       NEXT SENTENCE.
MAN-PRJ-RECORD-STORING-EXIT.EXIT.
RANGE-FIRM-LINK-STORING SECTION.
DISPLAY 'RANGE-FIRM-LINK IN'.
RANGE-FIRM-LINK-STORING-ENTRY.
           READ LOAD-FILE
             AT END MOVE 'TRUE' TO END-OF-FILE.
DISPLAY LOAD-RECORD.
IF END-OF-FILE = 'FALSE'
           MOVE LOAD-RECORD TO RANGE-FIRM-LINK-1
           MOVE RAN-1 TO RANGE-FIRM-LINK
                                 STORE RANGE-FIRM-LINK.
DISPLAY 'RANGE FIRM LINK OUT'.
RANGE-FIRM-LINK-STORING-EXIT.EXIT.
```

```
IDENTIFICATION DIVISION.
PROGRAM-ID.UPDATI.
AUTHOR.SSABAS.
ENVIRONMENT DIVISION.
  INPUT-OUTPUT SECTION.
    FILE-CONTROL.
        SELECT ITEM-EQPT-FILE ASSIGN TO DSK
        RECORDING MODE IS ASCII
        ACCESS MODE IS INDEXED
          RECORD KEY IS ITEM-EQPT-I
        SYMBOLIC KEY TS T-ITEM-EQPT.
 DATA DIVISION.
 FILE SECTION.
 FD ITEM-EQPT-FILE
        VALUE OF ID 'ITEM  SPE'
        BLOCK CONTAINS 5 RECORDS
        DATA RECORD IS ITEM-EQPT-RECORD.

01      ITEM-EQPT-RECORD.
        02 ITEM-EQPT-T              PIC X(24).
        02 ITEM-SPEC                PIC X(12).
SCHEMA SECTION.
        INVOKE SUB-SCHEMA SOS OF SSABAS
        PRIVACY KEY FOR COMPILE IS LETHAL.

WORKING-STORAGE SECTION.
01      XBS                 PIC 9(8) COMP VALUE 16.
01      BSA REDEFINES XBS.
        02  FILLER                  PIC X(4) DISPLAY-7.
        02  BS                      PIC X.
77      MORE-FIRM                   PIC X VALUE 'Y'.
77      MORE-ITEM                   PIC X VALUE 'Y'.
77      TYPE-CODE                   PIC 9.
77      MORE-TRANSACTIONS           PIC X VALUE 'Y'.
77      ACCEPT-CODE                 PIC X.
77      DOUBLE-CHECK                PIC X.

77      MORE-PROJECT    PIC X VALUE 'Y'.
77      MORE-MAN-PRO                PIC X VALUE 'Y'.
77      I-ITEM-EQPT                 PIC X(24).
77      T-ITEM-SPEC                 PIC X(12).
PROCEDURE DIVISION.
MAIN-PROGRAM SECTION.
MAIN-PROGRAM-ENTRY.
        OPEN INPUT-OUTPUT ITEM-EQPT-FILE.
        PERFORM AREAS-OPENING.
        DISPLAY'IF EXECUTION TERMINATES ABRUPTLY,THEN GIVE FOLLOWING
        DISPLAY 'COMMAND IN MONITERX MODE'.
        DISPLAY 'DO MFG.MIC'.
```

```
           PERFORM UPDATING-BASE UNTIL MORE-TRANSACTIONS = 'N'.
           DISPLAY 'UPDATING IS SUCCESSFUL'
           CLOSE ITEM-EOPT-FILE.
           CLOSE ALL.
           STOP RUN.
MAIN-PROGRAM-EXIT.EXIT.
AREAS-OPENING SECTION.
AREAS-OPENING-ENTRY.
                    OPEN AREA INSPECTION-DETAIL-AREA
                    USAGE-MODE EXCLUSIVE UPDATE.
                    OPEN AREA ITEM-DETAIL-AREA
                    USAGE-MODE EXCLUSIVE UPDATE.
                    OPEN AREA PROJECT-DETAIL-AREA
                    USAGE-MODE EXCLUSIVE UPDATE.
                    OPEN AREA FIRM-INFO-AREA
                    USAGE-MODE EXCLUSIVE UPDATE.
                    OPEN AREA MAN-PRO-AREA
                    USAGE-MODE IS EXCLUSIVE UPDATE
AREAS-OPENING-EXIT.EXIT.
UPDATING-BASE SECTION.
UPDATING-BASE-ENTRY.
           DISPLAY 'TYPE 1 IF YOU WISH TO ADD NEW FIRM:'
           DISPLAY 'TYPE 2 IF YOU WANT TO DELETE FIRM:'
           WITH NO ADVANCING ACCEPT TYPE-CODE.
IF TYPE-CODE = 1
           PERFORM FIRM-RECORD-STORING
           MOVE 'Y' TO MORE-PROJECT MORE-ITEM
           PERFORM PROJECT-RECORD-STORING UNTIL MORE-PROJECT = 'N'
PERFORM ITEM-RECORD-STORING UNTIL MORE-ITEM = 'N'
PERFORM MAN-PRO-RECORD-STORING UNTIL MORE-MAN-PRO = 'N'.
IF TYPE-CODE = 2
           PERFORM FIRM-DELETION.
IF TYPE-CODE IS <1 OR >2
           DISPLAY 'IMPROPER CODE TYPE-CODE'
GO TO UPDATING-BASE-END.
DISPLAY ' UPDATING IS SUCCESSFUL'.
MOVE SPACES TO MORE-TRANSACTIONS.
PERFORM TRANSACTIONS-CHECKING UNTIL MORE-TRANSACTIONS = 'Y' OR 'N'.
UPDATING-BASE-END.EXIT.
TRANSACTIONS-CHECKING SECTION.
TRANSACTIONS-CHECKING-BEGIN.
DISPLAY 'TYPE Y IF YOU WISH TO INSERT OR DELETE ANY MORE RECORDS'.
           DISPLAY 'ELSE TYPE N:'
WITH NO ADVANCING
ACCEPT MORE-TRANSACTIONS.
TRANSACTIONS-CHECKING-END.EXIT.
ITEM-RECORD-STORING SECTION.
ITEM-RECORD-STORING-ENTRY.
DISPLAY 'GIVE CAT-PAT-NO IN X(14):'
```

```
WITH NO ADVANCING
ACCEPT CAT-PAT-NO
DISPLAY 'GIVE ITEM-EQPT-DIS IN X(24); GIVING ONE BLANK'
WITH NO ADVANCING
ACCEPT ITEM-EQPT-DIS
MOVE ITEM-EQPT-DIS TO T-ITEM-EQPT.
READ ITEM-EQPT-FILE
          INVALID KEY
          DISPLAY 'THIS IS NEW ITEM/EQPT SO PLEASE TYPE'
          DISPLAY 'ITEM-SPEC GIVING ONE BLANK:'
          WITH NO ADVANCING
          ACCEPT ITEM-SPEC
          WRITE ITEM-EQPT-RECORD
          INVALID KEY
                    GO TO UNEVEN-EXIT.
          MOVE T-ITEM-EQPT TO ITEM-EQPT
          FIND ITEM-RECORD
          IF ERROR-STATUS = 0326
                    STORE ITEM-RECORD
                    STORE ITEM-FIRM-LINK
          ELSE
                    STORE ITEM-FIRM-LINK.
MOVE SPACES TO MORE-ITEM.
PERFORM MORE-ITEM-CHECKING UNTIL MORE-ITEM = 'Y' OR 'N'
ITEM-RECORD-STORING-EXIT.EXIT.
FIRM-RECORD-STORING SECTION.
FIRM-RECORD-STORING-ENTRY.
          DISPLAY 'TYPE NAME-FIRM IN X(24):'WITH NO ADVANCING
          ACCEPT NAME-FIRM
          DISPLAY'IMPORTENT-DEF-ITEM-PRO INX36:'
          WITH NO ADVANCING
          ACCEPT IMPORTENT-DEF-ITEM-PRO
          DISPLAY 'GIVE REMARKS-OF-VISITING-OFFICER IN X24:'
          WITH NO ADVANCING
          ACCEPT REMARK-OF-VISITING-OFFICER
          DISPLAY 'TYPE CONTROAL-NO-OF-CIL ALLOTED IN X6:'
          WITH NO ADVANCING
          ACCEPT CONTROL-NUMBER-OF-CIL
          DISPLAY 'NATURE-AND-SIZE-OF-INDUSTRY X:'
          WITH NO ADVANCING
          ACCEPT NATURE-AND-SIZE-OF-INDUSTRY
          DISPLAY 'TYPE R AND D FACILITIES AVAILABLE WITH THE FIRM IN X
          WITH NO ADVANCING
          ACCEPT FACILITY-AVAILABLE-FOR-RANDD
          DISPLAY 'TYPE QUALITY -CONTROL-SYSTEM OF FIRM X4:'
          WITH NO ADVANCING
          ACCEPT QUALITY-CONTROL-SYSTEM
          DISPLAY 'TEST-CERTIFICATES HELD BY FIRM 99:'
          WITH NO ADVANCING
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```
           ACCEPT TEST-CERTIFICATE
           DISPLAY 'GIVE NO OF QUALIFICATION-APPROVAL-CERTIFICATES '
           DISPLAY 'HELD BY FIRM:'
           WITH NO ADVANCING
           ACCEPT QUAL-APPR-CERT
           DISPLAY 'GIVE NUM-TEST-CERTIFICATES-HELD BY FIRM 99:'
           WITH NO ADVANCING
           ACCEPT LIMITED-TEST-CERTIFICATES
           DISPLAY 'GIVE FINANCIAL-POSITION OF THE FIRM IN X(6) CH:'
           WITH NO ADVANCING
           ACCEPT FINANCIAL-POSITION
           DISPLAY 'GIVE NUMBER OF CURRENT-SUPPLY-ORDER '
           DISPLAY 'EXISTING WITH THE FIRM:'
           WITH NO ADVANCING
           ACCEPT CURRENT-SUPPLY-ORDER
           DISPLAY 'GIVE NO OF ORDER EXECUTED WITH DELAY IN 99:'
           WITH NO ADVANCING
           ACCEPT NO-SUPORD-EX-WDELAY
           DISPLAY 'NO OF ORDER CANCELLED DUE UNSAT PERFORMANCE IN 99:'
           WITH NO ADVANCING
           ACCEPT SUPORD-CANC-UNSAT-PER
           DISPLAY 'NO-OF-TIME-IF-FLOTED IN 99:'
           WITH NO ADVANCING
           ACCEPT NO-OF-TIME-IF-FLOATED
           DISPLAY 'GIVE NO OF QUOT ACCEPTED IN 99:'
           WITH NO ADVANCING
           ACCEPT NO-OF-QUOTATION-ACCEPTED
           DISPLAY 'GIVE NO OF ORDER EXECUTED BY FIRM IN 99:'
           WITH NO ADVANCING
           ACCEPT NO-OF-ORDERS-EXECUTED-BY-FIRM
           DISPLAY 'TYPE FIRM-CODE IN X(28):'
           WITH NO ADVANCING
           ACCEPT FIRM-CODE
           DISPLAY 'GIVE RATING-OF-FIRM IN X(4):'
           WITH NO ADVANCING
           ACCEPT RATING-OF-FIRM.
DISPLAY    'DO YOU WISH TO CORRECT ENTRIES IN RECORD'
DISPLAY    'TYPE Y'
DISPLAY    'ELSE TYPE N:'
WITH NO ADVANCING
ACCEPT DOUBLE-CHECK
IF DOUBLE-CHECK = 'Y'
           GO TO FIRM-RECORD-STORING-ENTRY
ELSE
           STORE FIRM-RECORD.
FIRM-RECORD-STORING-EXIT.EXIT.
RANGE-FIRM-LINK-STORING SECTION.
RANGE-FIRM-LINK-STORING-ENTRY.
           DISPLAY 'GIVE MAN-SPEC X(12):'
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```
           WITH NO ADVANCING
           ACCEPT MAN-SPEC
           DISPLAY 'GIVE RATE OF PRODUCTION X(8):'
           WITH NO ADVANCING
           ACCEPT RATE-PROD
DISPLAY 'DO YOU WISH TO CORRECT ENTRIES IN THE RECORD'
DISPLAY 'TYPE Y ELSE TYPE N:'
ACCEPT DOUBLE-CHECK.
IF DOUBLE-CHECK ='Y'
           GO TO RANGE-FIRM-LINK-STORING-ENTRY
ELSE
           STORE RANGE-FIRM-LINK.
RANGE-FIRM-LINK-STORING-END.EXIT.

MORE-ITEM-CHECKING SECTION.
MORE-ITEM-CHECKING-BEGIN.
           DISPLAY 'TYPE Y IF YOU HAVE MORE ITEMS TO ADD'
           DISPLAY ' TYPE N OTHERWISE:'
           WITH NO ADVANCING
           ACCEPT MORE-ITEM.
MORE-ITEM-CHECKING-END.EXIT.

PROJECT-RECORD-STORING SECTION.
PROJECT-RECORD-STORING-ENTRY.
           DISPLAY 'GIVE  NAME-OF-PROJECT X(12):'
           WITH NO ADVANCING
           ACCEPT NAME-OF-PROJECT
           DISPLAY 'GIVE  QTY 4CH:'
           WITH NO ADVANCING
           ACCEPT QTY
           DISPLAY 'GIVE  PROJECT-VALUE IN 8CH:'
           WITH NO ADVANCING
           ACCEPT PROJECT-VALUE
           DISPLAY 'GIVE  DATE-PROTOTYPE-REQUIRED X(8):'
           WITH NO ADVANCING
           ACCEPT DATE-PROTOTYPE-REQUIRED
           DISPLAY 'NO-EXT-GTV-FORSUB-PROT IN 2CH:'
           WITH NO ADVANCING
           ACCEPT NO-EXT-GTV-FORSUB-PROT
           DISPLAY 'D-PROT-ED-FOR-EVA IN 8CH:'
           WITH NO ADVANCING
           ACCEPT D-PROT-ED-FOR-EVA
           DISPLAY 'PROJECTION-REFERENCE IN X(8):'
           WITH NO ADVANCING
           ACCEPT PROJECTION-REFERENCE
           DISPLAY 'PRE-SOUR-PROC-W-PRICE X(20):'
           WITH NO ADVANCING
           ACCEPT PRE-SOUR-PROC-W-PRICE
           DISPLAY 'D-QUOT-OPEN-R-TCOEM IN X(12):'
```

```
           WITH NO ADVANCING
           ACCEPT D-QUOT-OPEN-R-TCLEM
DISPLAY 'DO YOU WISH TO CORRECT ENTRIES IN RECORD:'
DISPLAY 'TYPE Y ELSE TYPE N:'
WITH NO ADVANCING
ACCEPT DOUBLE-CHECK.
IF DOUBLE-CHECK ='Y'
           GO TO PROJECT-RECORD-STORING-ENTRY
ELSE
           STORE PROJECT-RECORD
           STORE PROJECT-FIRM-LINK
           MOVE SPACES TO MORE-PROJECT
           PERFORM MORE-PROJECT-CHECKING UNTIL MORE-PROJECT = 'Y' OR 'N'
PROJECT-RECORD-STORING-END.EXIT.
MAN-PRJ-RECORD-STORING SECTION.
MAN-PRJ-RECORD-STORING-ENTRY.
           DISPLAY 'ITEM-EOPT IN X(24):'
           WITH NO ADVANCING
           ACCEPT ITEM-EOPT
           FIND MAN-PRO-RECORD
           IF ERROR-STATUS = 0326
           STORE MAN-PRO-RECORD
           PERFORM RANGE-FIRM-LINK-STORING
           ELSE
                      PERFORM RANGE-FIRM-LINK-STORING.
PERFORM MORE-MAN-PRO-CHECKING.
MAN-PRJ-RECORD-STORING-END.EXIT.

FIRM-DELETION SECTION.
FIRM-DELETION-ENTRY.
           DISPLAY 'NAME-FIRM:'
           WITH NO ADVANCING
           ACCEPT NAME-FIRM
           FIND FIRM-RECORD
           IF ERROR-STATUS = 0326
                      DISPLAY 'NO FIRM EXISTS WITH GIVEN NAME'
           GO TO FIRM-DELETION-END.
           GET FIRM-RECORD
           DISPLAY 'DO YOU REALLY WISH TO DELETE THIS FIRM:'
           DISPLAY ' 'NAME-FIRM' '
           DISPLAY 'IF YES TYPE Y ELSETYPE N:'
           WITH NO ADVANCING
           ACCEPT ACCEPT-CODE
           IF ACCEPT-CODE = 'Y'
                      DELETE FIRM-RECORD ALL.
FIRM-DELETION-END.EXIT.
PROJECT-DELETION SECTION.
PROJECT-DELETION-ENTRY.
           DISPLAY 'NAME-OF-PROJECT:'
```

```
           WITH NO ADVANCING
           ACCEPT NAME-OF-PROJECT
           FIND PROJECT-RECORD
           DISPLAY 'DO YOU REALLY WISH TO DELETE THIS PROJECT:'
           DISPLAY ' 'NAME-OF-PROJECT'.'
           DISPLAY 'IF YES TYPE Y ELSETYPE N:'

           WITH NO ADVANCING
           ACCEPT ACCEPT-CODE
           IF ACCEPT-CODE = 'Y'
                     DELETE PROJECT-RECORD ALL.
PROJECT-DELETION-END.EXIT.
MAN-PRO-DELETION SECTION.
MAN-PRO-DELETION-ENTRY.
           DISPLAY 'ITEM-EOPT:'
           WITH NO ADVANCING
           ACCEPT ITEM-EOPT
           FIND MAN-PRO-RECORD
           DISPLAY 'DO YOU REALLY WISH TO DELETE THIS MAN-PRO:'
           DISPLAY ' 'ITEM-EOPT'.'
           DISPLAY 'IF YES TYPE Y ELSETYPE N:'

           WITH NO ADVANCING
           ACCEPT ACCEPT-CODE
           IF ACCEPT-CODE = 'Y'
                     DELETE MAN-PRO-RECORD ALL.
MAN-PRO-DELETION-END.EXIT.
MORE-PROJECT-CHECKING SECTION.
MORE-PROJECT-CHECKING-BEGIN.
           DISPLAY 'TYPE Y IF YOU HAVE MORE PROJECTS TO ADD'
           DISPLAY ' TYPE N OTHERWISE:'
           WITH NO ADVANCING
           ACCEPT MORE-PROJECT.
MORE-PROJECT-CHECKING-END.EXIT.
MORE-MAN-PRO-CHECKING SECTION.
MORE-MAN-PRO-CHECKING-BEGIN.
           DISPLAY 'TYPE Y IF YOU HAVE MORE MAN-PROS TO ADD'
           DISPLAY ' TYPE N OTHERWISE:'
           WITH NO ADVANCING
           ACCEPT MORE-MAN-PRO.
MORE-MAN-PRO-CHECKING-END.EXIT.
UNEVEN-EXIT SECTION.
UNEVEN-EXIT-BEGIN.
           DISPLAY 'NO STORAGE SPACE AVAILABLE IN THE INDEX FILE'
           DISPLAY 'ITEM SPE.IDA'
           DISPLAY 'MODIFY THE INDEX FILE SPECIFICAITON USING ISAM'
UNEVEN-EXIT-END.EXIT.
```

```
IDENTIFICATION DIVISION.
PROGRAM-ID.PTRVAL.
AUTHOR.SSA.
ENVIRONMENT DIVISION.
INPUT-OUTPUT SECTION.
FILE-CONTROL.
        SELECT OUT-FILE ASSIGN TO DSK
        RECORDING MODE IS ASCII.
DATA DIVISION.
FILE SECTION.
FD      OUT-FILE
                VALUE OF ID 'INFORMFIL'
                REPORTS ARE REPORT-1 REPORT-2 REPORT-5.
SCHEMA SECTION.
        INVOKE SUB-SCHEMA SOS OF SCHEMA SSABAS
        PRIVACY KEY FOR COMPILE IS LETHAL.

WORKING-STORAGE SECTION.
77      SUCCESS-COUNT                   PIC 9.
77      SAA-PRO-I                       PIC X(24).
77      ERROR-CHECK                     PIC X(5) VALUE 'FALSE'.
77      WORK-RETRIEVAL                  PIC X VALUE 'Y'.
77      I-COUNT                         PIC 99.
77      END-OF-PROJECTS                 PIC X(5).
77      END-OF-SET                      PIC X(5).
77      TYPE-CODE                       PIC X.
77      PR-VAL                  PIC X(24).
77      ITEM-KEY                        PIC X(24).
77      SEARCH-KEY                      PIC X(5).
77      SAV-SAA-PRO                     PIC X(24).
77      INV-PROJECT                     PIC X(24).
77      FIRST-TIME                      PIC 9.
77      TTY                             PIC X.
77      COUNT                           PIC 999.
77      J                               PIC 999.
77      SUCCEEDED                       PIC X(5).
77      P-NAME                          PIC X(12).

01    REPORTS-IN-USE.
02   ONE PIC X VALUE SPACES.
02  TWO PIC X VALUE SPACES.
02   FIVE PICTURE X VALUE SPACES.
01        I-PROJECT-RECORD.                                  PIC X(12).
          02      I-NAME-OF-PROJECT
REPORT SECTION.
RD REPORT-1
        PAGE LIMIT IS 60 CONTROL IS NAME-OF-PROJECT.
01  TYPE CH NAME-OF-PROJECT  LINE IS NEXT PAGE.
        02 LINE PLUS 2.
                03 COLUMN 10 PIC X(10)
                VALUE 'FIRMS FOR:'.
```

```
                03 COLUMN 25 PIC X(14)
                SOURCE NAME-OF-PROJECT.
        02 LINE PLUS 2.
                03 COLUMN 2 PIC X(130)
                VALUE ALL '-'.
        02 LINE PLUS 2.
                03 COLUMN 5 PIC X(2)
                VALUE 'NO'.
                03 COLUMN 10 PIC X(9)
                VALUE 'NAME-FIRM'.
                03 COLUMN 45 PIC X(09)
                VALUE 'FIRM-CODE'.
                03 COLUMN 72 PIC X(23)
                VALUE 'EXISTING ORDERS ON FIRM'.
                03 COLUMN 98 PIC X(14)
                VALUE 'RATING-OF-FIRM'.
        02 LINE PLUS 1.
                        03 COLUMN 2 PIC X(130)
                        VALUE ALL '-'.
01 LINE-1 TYPE DE.
        02 LINE PLUS 2.
                03 COLUMN 4 PIC Z9
                SOURCE T-COUNT.
                03 COLUMN 10 PIC X(24)
                SOURCE NAME-FIRM.
                03 COLUMN 45 PIC X(28)
                SOURCE FIRM-CODE.
                03 COLUMN 80 PIC 9(2)
                SOURCE CURRENT-SUPPLY-ORDER.
                03 COLUMN 100 PIC X(4)
                SOURCE RATING-OF-FIRM.
01      LINE-1-1 TYPE DE.
        02      LINE PLUS 4.
                03 COLUMN 30 PIC X(14)
                VALUE 'NO FIRMS EXIST'.

RD REPORT-2
        PAGE LIMIT IS 60 CONTROL IS PH-VAL.
        01 TYPE CH PH-VAL LINE IS NEXT PAGE.
        02 LINE PLUS 2.
                03 COLUMN 2 PIC X(9)
                VALUE 'FIRMS FOR'.
                03 COLUMN 12 PIC X(24)
                        SOURCE PH-VAL.
                03 COLUMN 38 PIC X(24)
                SOURCE ITEM-KEY.
        02 LINE PLUS 1.
                03 COLUMN 40 PIC X(24)
                SOURCE SND-MAN-PRO.
        02 LINE PLUS 2.
                03 COLUMN 4 PIC X(130)
                VALUE ALL '-'.
```

```
        02 LINE PLUS 1.
           03 COLUMN 5 PIC X(2)
           VALUE 'NO'.
           03 COLUMN 15 PIC X(9)
           VALUE 'NAME-FIRM'.
           03 COLUMN 45 PIC X(9)
           VALUE 'FIRM-CODE'.
           03 COLUMN 75 PIC X(29)
           VALUE 'IMP-DEFENCE ITEM MANUFACTURED'.
        02 LINE PLUS 1.
           03 COLUMN 2 PIC X(130)
           VALUE ALL '='.
01      LINE-2 TYPE DE.
        02 LINE PLUS 2.
           03 COLUMN 4 PIC Z9
           SOURCE T-COUNT.
           03 COLUMN 16 PIC X(24)
           SOURCE NAME-FIRM.
           03 COLUMN 45 PIC X(28)
           SOURCE FIRM-CODE.
           03 COLUMN 75 PIC X(36)
           SOURCE IMPORTENT-DEF-ITEM-PRO.
01      LINE-2-1 TYPE DE.
        02      LINE PLUS 4.
           03 COLUMN 30 PIC X(14)
           VALUE 'NO FIRMS EXIST'.
RD REPORT-2
        PAGE LIMIT IS 60 CONTROL IS IND-PROJECT.
01 TYPE CH IND-PROJECT LINE IS NEXT PAGE.
        02 LINE PLUS 2.
           03 COLUMN 3 PIC X(10)
           VALUE 'FIRMS FOR:'.
           03 COLUMN 15 PIC X(12)
           SOURCE IND-PROJECT.
        02 LINE PLUS 1.
           03 COLUMN 3 PIC X(8)
           VALUE 'MAN-PRO:'.
           03 COLUMN 19 PIC X(24)
           SOURCE ITEM-EOPT.
        02 LINE PLUS 2.
           03 COLUMN 2 PIC X(130)
           VALUE ALL '-'.
        02 LINE PLUS 2.
           03 COLUMN 5 PIC X(2)
           VALUE 'NO'.
           03 COLUMN 30 PIC X(9)
           VALUE 'NAME-FIRM'.
           03 COLUMN 55 PIC X(9)
           VALUE 'FIRM-CODE'.
        02 LINE PLUS 1.
           03 COLUMN 2 PIC X(130)
```

```
                    VALUE ALL '-'.
01 LINE-3 TYPE DE.
        02 LINE PLUS 2.
                    03 COLUMN 4 PIC Z9
                    SOURCE T-COUNT.
                    03 COLUMN 20 PIC X(24)
                    SOURCE NAME-FIRM.
                    03 COLUMN 50 PIC X(28)
                    SOURCE FIRM-CODE.
01 LINE-3-1 TYPE DE.
        02 LINE PLUS 4.
        03 COLUMN 30 PIC X(14)
        VALUE 'NO FIRMS EXIST'.
PROCEDURE DIVISION.
MAIN-PROGRAM SECTION.
MAIN-PROGRAM-ENTRY.
        OPEN OUTPUT OUT-FILE.
        PERFORM AREAS-OPENING.
ASK-TTY.
        DISPLAY ' '
        DISPLAY 'TYPE Y IF OUTPUT ON TTY IS
        WITH NO ADVANCING
        ACCEPT TTY.
        IF TTY NOT = 'Y' AND 'N' GO TO ASK-
        PERFORM USER-INFORMATION
                        UNTIL MORE-RETRIEVA
        PERFORM FIRM-ALL-INITIATED-REPORTS.
        CLOSE OUT-FILE.
        CLOSE ABC.
        STOP RUN.
MAIN-PROGRAM-EXIT.EXIT.

USER-INFORMATION SECTION.
USER-INFORMATION-ENTRY.
        MOVE 0 TO T-COUNT
        DISPLAY ' '
        DISPLAY 'TYPE 1 IF FIRMS FOR EXISTI
        DISPLAY ' '
        DISPLAY 'TYPE 2 IF YOU WANT TO KNOWAR ITEM TO DEFENCE '
        DISPLAY ' '
DISPLAY 'TYPE 3 IF FIRMS REGISTERED WITH DE
        DISPLAY ' '
        DISPLAY 'TYPE 4 IF FIRMS FOR TWO PA
        DISPLAY ' '
        DISPLAY 'TYPE 5 IF FIRMS HAVING A DORED:'
        WITH NO ADVANCING
        ACCEPT TYPE-CODE.
        MOVE 1 TO FIRST-TIME
        IF TYPE-CODE = 1
        MOVE 'FALSE' TO END-OF-PROJECTS
        DISPLAY 'TYPE NAME-OF-PROJECT:'
```

```
          WITH NO ADVANCING
          ACCEPT NAME-OF-PROJECT
          MOVE NAME-OF-PROJECT TO P-NAME
          PERFORM FIND-PROJECT-FIRM UNTIL END-OF-PROJECTS='TRUE'.
          IF TYPE-CODE = 2
          PERFORM FIND-ITEM-FIRM
          ELSE
                    IF TYPE-CODE = 3 OR 4 OR 5
                    PERFORM FIND-MAN-PRO-FIRM.
          IF TYPE-CODE <1 OR >5
          DISPLAY 'IMPROPER CODE GIVE CORRECT CODE'
          GO TO USER-INFORMATION-ENTRY.
          IF TYPE-CODE = 1 OR 2 OR 3
                    MOVE 1 TO SUCCESS-COUNT.
          IF SUCCESS-COUNT = 1
             IF ERROR-CHECK = 'FALSE'
                    DISPLAY ' '
          DISPLAY ' THE REQESTED INFORMATION IS IN FILE INFORM.FIL'
          ELSE
                    NEXT SENTENCE
ELSE
          DISPLAY 'NO FIRM SATISFIES THE REQUIRED CONDITIONS'
          IF TYPE-CODE = 4 PERFORM INIT-REP-2  GENERATE LINE-2-1
          ELSE PERFORM INIT-REP-5 GENERATE LINE-5-1.
CHECK-MORE-RETRIEVALS.
          DISPLAY 'IF YOU WANT MORE-INFORMATION TYPE Y '.
          DISPLAY 'ELSE TYPE N:'
          WITH NO ADVANCING
          ACCEPT MORE-RETRIEVAL.
          IF MORE-RETRIEVAL NOT = 'Y' AND 'N'
                    GO TO CHECK-MORE-RETRIEVALS.
          MOVE 'FALSE' TO ERROR-CHECK.
USER-INFORMATION-END.EXIT.

FIND-PROJECT-FIRM SECTION.
FIND-PROJECT-FIRM-BEGIN.
          MOVE 0 TO I-COUNT.
          IF FIRST-TIME = 1
                    MOVE 0 TO FIRST-TIME
                    FIND PROJECT-RECORD
                    IF ERROR-COUNT>0
                              MOVE 'TRUE' TO ERROR-CHECK
                              DISPLAY ' '
                              DISPLAY 'THIS PROJECT NAME DOSE NOT EXIST'
                              PERFORM INIT-REP-1
                                        GENERATE LINE-1-1
                              ELSE NEXT SENTENCE
                    ELSE
                              FIND NEXT RECORD OF ALL-PROJECTS SET.
                    IF ERROR-COUNT >0
                              MOVE 'TRUE' TO END-OF-PROJECTS
```

```
                    GO TO FIND-PROJECT-FIRM-END.
                GET PROJECT-RECORD.
                PERFORM INIT-REP-1.
        IF NAME-OF-PROJECT NOT = P-NAME
                MOVE 'TRUE' TO END-OF-PROJECTS
                    GO TO PROJECT-TERMINATION.
                MOVE 'FALSE' TO END-OF-SET
                PERFORM DISPLAY-PROJECT-FIRMS
                UNTIL END-OF-SET = 'TRUE'.
PROJECT-TERMINATION.
FIND-PROJECT-FIRM-END.EXIT.

DISPLAY-PROJECT-FIRMS SECTION.
DISPLAY-PROJECT-FIRMS-BEGIN.
        FIND NEXT RECORD OF PROJECT-FIRM SET.
                IF ERROR-COUNT>0
                    IF ERROR-STATUS = 0326
                      DISPLAY ' '
                      DISPLAY 'NO FIRM EXITS FOR THIS PROJECT'
                    MOVE 'TRUE' TO END-OF-SET
                    MOVE 'TRUE' TO ERROR-CHECK
                    GENERATE LINE-1-1
                            GO TO DISPLAY-PROJECT-FIRMS-END
                    ELSE
                            MOVE 'TRUE' TO END-OF-SET
                            GO TO DISPLAY-PROJECT-FIRMS-END.
                    FIND OWNER RECORD OF FIRM-PROJECT SET
                    ADD 1 TO T-COUNT

        GET FIRM-RECORD
        GENERATE LINE-1
IF TTY = 'Y' DISPLAY LINE-1.
DISPLAY-PROJECT-FIRMS-END.EXIT.

FIND-ITEM-FIRM SECTION.
FIND-ITEM-FIRM-BEGIN.
        MOVE 0 TO T-COUNT.
        DISPLAY 'TYPE CAT-PAT-NO :'
        WITH NO ADVANCING
ACCEPT CAT-PAT-NO.
MOVE CAT-PAT-NO TO PH-VAL
                PERFORM INIT-REP-2
        FIND ITEM-RECORD
        MOVE ITEM-EOPT-DIS TO ITEM-KEY
        IF ERROR-COUNT>0
          MOVE 'TRUE' TO ERROR-CHECK
        DISPLAY ' '
        DISPLAY 'ITEM DOES NOT EXIST'
        GENERATE LINE-2-1

ELSE
GET ITEM-RECORD
MOVE ITEM-EOPT-DIS TO ITEM-KEY
```

```
          MOVE 'FALSE' TO END-OF-SET
          PERFORM DISPLAY-ITEM-FIRM UNTIL END-OF-SET = 'TRUE'.
FIND-ITEM-FIRM-END.EXIT.

DISPLAY-ITEM-FIRM SECTION.
DISPLAY-ITEM-FIRM-BEGIN.
          FIND NEXT RECORD OF ITEM-FIRM SET
                    IF ERROR-COUNT>0
                       IF ERROR-STATUS = 0326
                            DISPLAY ' '
                            DISPLAY 'NO FIRM FOR THIS ITEM EXITS'
                            MOVE 'TRUE' TO END-OF-SET
                            MOVE 'TRUE' TO ERROR-CHECK
                            GENERATE LINE-2-1
                    ELSE
                            MOVE 'TRUE' TO END-OF-SET
                    ELSE
                            FIND OWNER RECORD OF FIRM-ITEM SET
                            ADD 1 TO T-COUNT
                            GET FIRM-RECORD
                            GENERATE LINE-2
                                  IF TTY = 'Y' DISPLAY LINE-2
                                  ELSE NEXT SENTENCE.
DISPLAY-ITEM-FIRM-END.EXIT.

FIND-MAN-PRO-FIRM SECTION.
FIND-MAN-PRO-BOOK-BEGIN.
          DISPLAY 'TYPE THE MAN-PRO:'
          WITH NO ADVANCING
          ACCEPT ITEM-EOPT.
MOVE ITEM-EOPT TO MAN-PRO-1.
MOVE ITEM-EOPT TO PH-VAL.
IF TYPE-CODE NOT = 4
          MOVE SPACES TO SND-MAN-PRO
ELSE
          DISPLAY 'TYPE SECOND MAN-PRO:'
          WITH NO ADVANCING
          ACCEPT SND-MAN-PRO.
IF TYPE-CODE NOT = 5
          MOVE 'MAN-PRO:' TO PH-VAL
          MOVE ITEM-EOPT TO ITEM-KEY
ELSE
          DISPLAY 'TYPE NAME OF PROJECT'
          WITH NO ADVANCING
          ACCEPT IND-PROJECT.
IF TYPE-CODE = 3 OR 4 PERFORM INIT-REP-2
ELSE                  PERFORM INIT-REP-5.
MOVE 0 TO T-COUNT.
FIND MAN-PRO-RECORD.
IF ERROR-COUNT > 0
          MOVE 'TRUE' TO ERROR-CHECK
```

```
          DISPLAY 'MAN-PRO DOES NOT EXIST'
          IF TYPE-CODE = 3 OR 4
                    GENERATE LINE-2-1
                    GO TO MAN-PRO-TERMINATION
          ELSE      GENERATE LINE-5-1
                    GO TO MAN-PRO-TERMINATION.
MOVE 'FALSE' TO END-OF-SET
MOVE 0 TO SUCCESS-COUNT
PERFORM DISPLAY-MAN-PRO-FIRM
  VARYING FCOUNT FROM 1 BY 1 UNTIL END-OF-SET = 'TRUE'.
MAN-PRO-TERMINATION.
FIND-MAN-PRO-FIRM-END.EXIT.


DISPLAY-MAN-PRO-FIRM SECTION.
DISPLAY-MAN-PRO-FIRM-BEGIN.
          MOVE MAN-PRO-1 TO ITEM-EQPT
          FIND MAN-PRO-RECORD.
AB.
     PERFORM FIND-NEXT
          VARYING J FROM 0 BY 1 UNTIL J = FCOUNT.
ABB.
          IF ERROR-COUNT >0
                    IF ERROR-STATUS = 0326
                      DISPLAY
                      DISPLAY 'NO FIRM FOR THIS MAN PRODUCT'
                              MOVE 'TRUE' TO END-OF-SET
                              MOVE 'TRUE' TO ERROR-CHECK
                              IF TYPE-CODE = 3 OR 4 GENERATE LINE-2-1.
                                DISPLAY 'NO FIRM FOR THIS MAN PRODUCT'
                                GO TO DISPLAY-MAN-PRO-FIRM-END
                              ELSE
                                  GENERATE LINE-5-1
                                  DISPLAY 'NO FIRM WITH THIS MAN-PRO'
                                  GO TO DISPLAY-MAN-PRO-FIRM-END.
          ELSE
                MOVE 'TRUE' TO END-OF-SET
                GO TO DISPLAY-MAN-PRO-FIRM-END.
MOVE 'FALSE' TO SEARCH-KEY SUCCEEDED
FIND OWNER RECORD OF FIRM-MAN-PRO SET.
GET FIRM-RECORD.
IF TYPE-CODE = 4
          PERFORM SEARCH-OTHER-MAN-PRO
            UNTIL SEARCH-KEY = 'TRUE' OR SUCCEEDED = 'TRUE'.
IF TYPE-CODE = 5
          PERFORM SEARCH-MAN-PROJECT
            UNTIL SEARCH-KEY = 'TRUE' OR SUCCEEDED = 'TRUE'.
IF TYPE-CODE =3 OR(TYPE-CODE = 4 AND SUCCEEDED = 'TRUE')
          PERFORM FIND-PROJECT.
IF TYPE-CODE = 3 OR SUCCEEDED = 'TRUE'
  ADD 1 TO T-COUNT
```

```
   IF TYPE-CODE = 5 GENERATE LINE-5
          IF TTY = 'Y' DISPLAY LINE-5
          ELSE NEXT SENTENCE
  ELSE GENERATE LINE-2
          IF TTY = 'Y' DISPLAY LINE-2.
  GO TO DISPLAY-MAN-PRO-FIRM-END.
FIND-NEXT.
   FIND NEXT RECORD OF MAN-PRO SET.
DISPLAY-MAN-PRO-FIRM-END.EXIT.

FIND-PROJECT SECTION.
FIND-PROJECT-BEGIN.
          FIND FIRST RECORD OF FIRM-PROJECT SET
          FIND OWNER RECORD OF PROJECT-FIRM SET
          GET PROJECT-RECORD.
FIND-PROJECT-END.EXIT.

SEARCH-OTHER-MAN-PRO SECTION.
SEARCH-OTER-MAN-PRO-BEGIN.
          FIND NEXT RECORD OF FIRM-MAN-PRO SET
          IF ERROR-COUNT >0
                    MOVE 'TRUE' TO SEARCH-KEY
          ELSE
                    FIND OWNER RECORD OF MAN-PRO SET
                    GET
                       IF ITEM-EQPT = SND-MAN-PRO
                             MOVE 1 TO SUCCESS-COUNT
                             MOVE 'TRUE' TO SUCCEEDED.
SEARCH-OTHER-MAN-PRO-END.EXIT.

SEARCH-MAN-PROJECT SECTION.
SEARCH-MAN-PROJECT-BEGIN.
          FIND NEXT RECORD OF FIRM-PROJECT SET.
          IF ERROR-COUNT >0
                    MOVE 'TRUE' TO SEARCH-KEY
          ELSE
                    FIND OWNER RECORD OF PROJECT-FIRM SET
                    GET
                    IF NAME-OF-PROJECT = IND-PROJECT
                             MOVE 1 TO SUCCESS-COUNT
                             MOVE 'TRUE' TO SUCCEEDED.
SEARCH-MAN-PROJECT-END.EXIT.
AREAS-OPENING SECTION.
AREAS-OPENING-ENTRY.
  OPEN ALL
  USAGE-MODE IS EXCLUSIVE RETRIEVAL.
AREAS-OPENING-END.EXIT.
INIT-REP-1 SECTION.
          IF ONE IS  = SPACES
                    MOVE 'X' TO ONE
                    INITIATE REPORT-1.
```

```
INIT-REP-2 SECTION.
           IF TWO IS  = SPACE
                      MOVE 'X' TO TWO INITIATE REPORT-2.
INIT-REP-5 SECTION.
           IF FIVE IS  = SPACES
                      MOVE 'X' TO FIVE INITIATE REPORT-5.
TERM-ALL-INITIATED-REPORTS SECTION.
           IF ONE IS NOT  = SPACES
                      TERMINATE REPORT-1.
           IF TWO IS NOT  = SPACE
                      TERMINATE REPORT-2.
           IF FIVE IS NOT  = SPACES
                      TERMINATE REPORT-5.
```